

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

BOARD OF DIRECTORS REGULAR MEETING AGENDA
OCTOBER 27, 2006 (Fourth Friday of Each Month)
CITY HALL COUNCIL CHAMBERS
809 CENTER STREET
SANTA CRUZ, CALIFORNIA
9:00 a.m. – Noon

THE BOARD AGENDA PACKET CAN BE FOUND ONLINE AT WWW.SCMTD.COM

NOTE: This meeting will be interrupted briefly at 10:00 a.m. to hold the annual meeting of the Santa Cruz Civic Improvement Corporation

NOTE: THE BOARD CHAIR MAY TAKE ITEMS OUT OF ORDER

SECTION I: OPEN SESSION - 9:00 a.m.

1. ROLL CALL
2. ORAL AND WRITTEN COMMUNICATION
 - a. R. Paul Marcelin-Sampson, MRU Re: Proposed Monterey Peninsula Service Realignment
 - b. Bonnie Morr, UTU Re: ParaCruz Labor Agreement
 - c. A. John Daugherty, Chair, E&D TAC Re: ParaCruz Customer Guide**
 - d. Rosa Dinatale Re: Service Request Petition**
3. LABOR ORGANIZATION COMMUNICATIONS
4. ADDITIONAL DOCUMENTATION TO SUPPORT EXISTING AGENDA ITEMS

CONSENT AGENDA

- 5-1. APPROVE REGULAR BOARD MEETING MINUTES OF SEPTEMBER 8 & 22, 2006
Minutes: **ARE INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
- 5-2. ACCEPT AND FILE PRELIMINARILY APPROVED CLAIMS FOR THE MONTH OF SEPTEMBER 2006
Report: Attached
- 5-3. ACCEPT AND FILE SEPTEMBER 2006 RIDERSHIP REPORT
Report: Attached
PAGE 1 OF THE RIDERSHIP REPORT IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET

- 5-4. CONSIDERATION OF TORT CLAIMS: DENY THE CLAIM OF CANDIDO VELASCO, CLAIM #06-0029; **DENY THE CLAIM OF JOHN RAMSAY, CLAIM #06-0028; DENY THE CLAIM OF ZANAIDA SUMANO, CLAIM #06-0031**
- 5-5. ACCEPT AND FILE THE METRO ADVISORY COMMITTEE (MAC) AGENDA FOR OCTOBER 18, 2006 **AND MINUTES OF AUGUST 16, 2006**
Agenda/Minutes: **MINUTES ARE INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
- 5-6. ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR JULY 2006 AND APPROVAL OF BUDGET TRANSFERS
Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
- 5-7. ACCEPT AND FILE HIGHWAY 17 STATUS REPORT FOR JULY 2006
Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
- 5-8. ACCEPT AND FILE PARACRUZ OPERATIONS STATUS REPORT FOR THE MONTH OF JULY 2006
Staff Report: Attached
- 5-9. ACCEPT AND FILE UNIVERSITY OF CALIFORNIA, SANTA CRUZ SERVICE UPDATE FOR MONTH OF AUGUST 2006
Staff Report: Attached
- 5-10. ACCEPT AND FILE MINUTES REFLECTING VOTING RESULTS FROM APPOINTEES TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR THE SEPTEMBER 2006 MEETING(S)
Staff report: **WILL BE INCLUDED IN THE NOVEMBER 2006 BOARD PACKET**
- 5-11. ACCEPT AND FILE METROBASE STATUS REPORT
Staff Report: Attached
- 5-12. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT RENEWAL WITH ALLIANT INSURANCE SERVICES FOR LONG TERM DISABILITY INSURANCE
Staff Report: Attached
- 5-13. ACCEPT AND FILE CALL STOP AUDIT REPORT FOR THE PERIOD OF JULY, AUGUST & SEPTEMBER 2006
Staff Report: Attached
- 5-14. CONSIDERATION OF APPROVAL OF BOARD OF DIRECTORS REGULAR MEETING SCHEDULE FOR 2007
Staff Report: Attached

REGULAR AGENDA

6. PRESENTATION OF EMPLOYEE LONGEVITY AWARDS
Presented by: Chair Rotkin
Staff Report: Attached
7. **DELETED: ACTION TAKEN AT THE OCTOBER 13, 2006 BOARD MEETING**
(CONSIDERATION OF APPROVAL OF A RESOLUTION DECLARING OCTOBER 19, 2006 AS METRO EMPLOYEE RECOGNITION DAY)
8. **DELETED: ACTION TAKEN AT THE OCTOBER 13, 2006 BOARD MEETING**
(CONSIDERATION FOR THE HUMAN RESOURCES DEPARTMENT TO AUTHORIZE THE USE OF AN EMPLOYEE'S 457 ACCOUNT, WHEN REQUESTED, FOR THE PURCHASE OF "AIR TIME")
9. **DELETED: ACTION TAKEN AT THE OCTOBER 13, 2006 BOARD MEETING**
(CONSIDERATION OF APPOINTMENT OF DIRECTORS TO THE SANTA CRUZ CIVIC IMPROVEMENT CORPORATION)
10. **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO PROVIDE SHUTTLE SERVICE FOR A COUNTY PUBLIC HEALTH DRILL/EXERCISE ON DECEMBER 9, 2006**
Presented By: Mark Dorfman, Assistant General Manager
Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
11. **CONSIDERATION OF THE APPOINTMENT OF A MEMBER OF THE BOARD OF DIRECTORS TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION'S TRANSPORTATION FUNDING TASK FORCE AS A REPLACEMENT FOR DIRECTOR PAT SPENCE**
Presented By: Leslie R. White, General Manager
Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
12. **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE CONSTRUCTION OF THE METROBASE MAINTENANCE BUILDING**
Presented By: Tom Stickel, Maintenance Manager
Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
13. **CONSIDERATION OF APPROVING THE UPDATED EQUAL EMPLOYEE OPPORTUNITY PLAN (EEOP)**
Presented by: Robyn Slater, Interim Human Resources Manager
Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**
14. **CONSIDERATION OF RESOLUTION AUTHORIZING AN AMENDED CLAIM TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR**

FY 2007 STATE TRANSIT ASSISTANCE FUNDS (STA) AND TRANSPORTATION DEVELOPMENT ACT (TDA) FUNDS

Presented By: Mark Dorfman, Assistant General Manager

Staff Report: **IS INCLUDED IN THE OCTOBER 27, 2006 BOARD PACKET**

15. **ANNOUNCEMENT: NOTIFICATION OF MEETING LOCATION FOR NOVEMBER 17, 2006 – WATSONVILLE CITY COUNCIL CHAMBERS, 250 MAIN STREET, WATSONVILLE**

Presented By: Chair Rotkin

Staff Report: Oral Announcement

16. REVIEW OF ITEMS TO BE DISCUSSED IN CLOSED SESSION: District Counsel

17. ORAL AND WRITTEN COMMUNICATIONS REGARDING CLOSED SESSION

SECTION II: CLOSED SESSION

1. CONFERENCE WITH LABOR NEGOTIATORS
(Pursuant to Government Code Section 54957.6)

a. Agency Negotiators: Robyn Slater, Human Resources Manager,
Chief Spokesperson
Mark Dorfman, Assistant General Manager
Margaret Gallagher, District Counsel
Elisabeth Ross, Finance Manager

1. Employee Organization: Service Employees International Union
(SEIU), Local 415

a. Agency Negotiators Robyn Slater, Human Resources Manager,
Chief Spokesperson
Margaret Gallagher, District Counsel
Steve Paulson, Paratransit Administrator

1. Employee Organization United Transportation Union (UTU), Local
23, ParaCruz Division

SECTION III: RECONVENE TO OPEN SESSION

18. REPORT OF CLOSED SESSION

ADJOURN

NOTICE TO PUBLIC

Members of the public may address the Board of Directors on a topic not on the agenda but within the jurisdiction of the Board of Directors or on the consent agenda by approaching the

Board during consideration of Agenda Item #2 "Oral and Written Communications", under Section I. Presentations will be limited in time in accordance with District Resolution 69-2-1.

When addressing the Board, the individual may, but is not required to, provide his/her name and address in an audible tone for the record.

Members of the public may address the Board of Directors on a topic on the agenda by approaching the Board immediately after presentation of the staff report but before the Board of Directors' deliberation on the topic to be addressed. Presentations will be limited in time in accordance with District Resolution 69-2-1.

The Santa Cruz Metropolitan Transit District does not discriminate on the basis of disability. The City Council Chambers is located in an accessible facility. Any person who requires an accommodation or an auxiliary aid or service to participate in the meeting, please contact Cindi Thomas at 831-426-6080 as soon as possible in advance of the Board of Directors meeting. Hearing impaired individuals should call 711 for assistance in contacting METRO regarding special requirements to participate in the Board meeting. A Spanish Language Interpreter will be available during "Oral Communications" and for any other agenda item for which these services are needed. This meeting will be broadcast live by Community Television of Santa Cruz on Channel 26.

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006

TO: Board of Directors

FROM: Les White, General Manager

SUBJECT: MATERIAL FOR THE OCTOBER 27, 2006 BOARD MEETING AGENDA

SECTION I:

OPEN SESSION: ADD TO ITEM #2

ORAL AND WRITTEN COMMUNICATION
(Insert new Written Communication)

CONSENT AGENDA: ADD TO ITEM #5-1

APPROVE REGULAR BOARD MEETING MINUTES OF SEPTEMBER
8 & 22, 2006
(Insert Minutes)

ADD TO ITEM #5-3

ACCEPT AND FILE AUGUST 2006 RIDERSHIP REPORT
(Insert Page 1)

ADD TO ITEM #5-4

CONSIDERATION OF TORT CLAIMS
(Insert new Claims #06-0028 and #06-0031)

ADD TO ITEM #5-5

ACCEPT AND FILE THE METRO ADVISORY COMMITTEE (MAC)
AGENDA FOR OCTOBER 18, 2006 AND MINUTES OF AUGUST 16,
2006
(Insert Minutes)

INSERT ITEM #5-6

ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR JULY
2006 AND APPROVAL OF BUDGET TRANSFERS
(Insert Staff Report)

INSERT ITEM #5-7

ACCEPT AND FILE HIGHWAY 17 STATUS REPORT FOR JULY 2006
(Insert Report)

REGULAR AGENDA: DELETE ITEM #7

CONSIDERATION OF APPROVAL OF A **RESOLUTION** DECLARING
OCTOBER 19, 2006 AS METRO EMPLOYEE RECOGNITION DAY
(Deleted: Action taken at the October 13, 2006 Board Meeting)

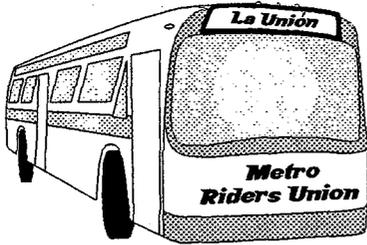
DELETE ITEM #8

CONSIDERATION FOR THE HUMAN RESOURCES DEPARTMENT
TO AUTHORIZE THE USE OF AN EMPLOYEE'S 457 ACCOUNT,
WHEN REQUESTED, FOR THE PURCHASE OF "AIR TIME"
(Deleted: Action taken at the October 13, 2006 Board Meeting)

DELETE ITEM #9

CONSIDERATION OF APPOINTMENT OF DIRECTORS TO THE
SANTA CRUZ CIVIC IMPROVEMENT CORPORATION
(Deleted: Action taken at the October 13, 2006 Board Meeting)

- ADD ITEM #10** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO PROVIDE SHUTTLE SERVICE FOR A COUNTY PUBLIC HEALTH DRILL/EXERCISE ON DECEMBER 9, 2006**
(Insert Staff Report)
- ADD ITEM #11** **CONSIDERATION OF THE APPOINTMENT OF A MEMBER OF THE BOARD OF DIRECTORS TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION'S TRANSPORTATION FUNDING TASK FORCE AS A REPLACEMENT FOR DIRECTOR PAT SPENCE**
(Insert Staff Report)
- ADD ITEM #12** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE CONSTRUCTION OF THE METROBASE MAINTENANCE BUILDING**
(Insert Staff Report)
- ADD ITEM #13** **CONSIDERATION OF APPROVING THE UPDATED EQUAL EMPLOYEE OPPORTUNITY PLAN (EEOP)**
(Insert Staff Report)
- ADD ITEM #14** **CONSIDERATION OF RESOLUTION AUTHORIZING AN AMENDED CLAIM TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR FY 2007 STATE TRANSIT ASSISTANCE FUNDS (STA) AND TRANSPORTATION DEVELOPMENT ACT (TDA) FUNDS**
(Insert Staff Report)
- ADD ITEM #15** **ANNOUNCEMENT: NOTIFICATION OF MEETING LOCATION FOR NOVEMBER 17, 2006 – WATSONVILLE CITY COUNCIL CHAMBERS, 250 MAIN STREET, WATSONVILLE**
(Oral Announcement – no documentation)



The Metro Riders Union
La Unión de Los Pasajeros

Post Office Box 1402
Santa Cruz California 95061
www.iridethebus.org
info@metroridersunion.org
(831) 421-9031

2006 September 15

Board of Directors
Monterey-Salinas Transit
One Ryan Ranch Road
Monterey California 93940

Re: *Proposed Monterey Peninsula Service Realignment*

To the Board of Directors:

Cancellation of the remaining bus service from Santa Cruz County to the City of Monterey, your county's main destination for tourism, graduate education, and other activities, is ill-advised.

At 80 minutes, **riding the bus between Watsonville and the City of Monterey takes two-and-a-half times as long as driving.** A transfer in Marina will make the trip even less attractive.

Please preserve Route 27 as a continuous service between Watsonville and the City of Monterey. This is far more important than the nominal improvement in frequency (from once every 3 hours to once every 2 hours) that staff hopes to achieve by truncating the route in Marina.

Whether Route 27 remains a Watsonville - City of Monterey service, which riders want, or becomes a Watsonville - Marina service, which staff wants, please direct staff to coordinate the schedule with key Santa Cruz Metropolitan Transit District services in Watsonville.

Each Route 27 trip can and should be timed to meet a Metro Route 91, 69W, 69A or 71 trip. These Metro routes span Santa Cruz County from the City of Santa Cruz to Watsonville, accounting for almost 25% of Metro's systemwide boardings. Meeting Routes 91 and 69W is especially important, because these routes offer the fastest service across our county.

At 170 minutes, riding the bus between the City of Santa Cruz and the City of Monterey takes three-and-a-half times as long as driving. Coordinating Route 27 with Santa Cruz Metro Routes 91 and 69W would reduce travel times by up to 30 minutes — a first step toward a viable transit connection between these important cities.

Thank you for considering these comments.

Yours truly,

R. Paul Marcelin-Sampson

Mr. R. Paul Marcelin-Sampson, Founder

cc: Mr. Ciro Aguirre, Operations Manager, Metro; Metro Advisory Committee

2-a.1

903 Pacific Ave Suite 200
Santa Cruz, CA 95060
831.429.6707

Base Representatives
Metro 831.423.0319
Lifeline 831.688-8840 x230

United Transportation Union

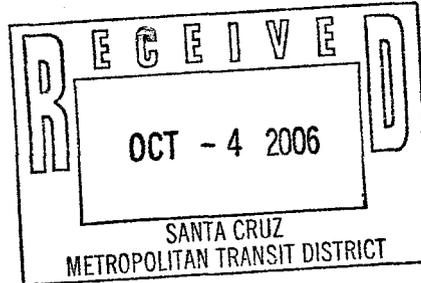
Local 23

The Voice of Rational Transportation in Santa Cruz County, California



October 2, 2006

Leslie White, General Manager
370 Encinal Street
Santa Cruz, California 95060



Dear Mr. White,

This letter is sent to register United Transportation Union Local 23's protest over Metro's continued violation of both the spirit and the language of the Para Cruz contract. It also is sent to inform you that UTU has realized that any further effort to convince Metro to fairly resolve the current dispute over the Article 29 bid process would be a futile endeavor.

Article 29.02 B provides "In establishing regular assignments, it will be the policy of Metro, through cooperation with the Union, to bring about the best working conditions consistently possible under service conditions." Despite this written agreement to work with UTU to establish the best possible working conditions, Metro has moved forward with an imposed bid process that not only fails to provide the best possible working conditions, but that also violates the terms of the recently negotiated agreement. But, rather than continue to have pointless meetings over this dispute, UTU has decided to allow the imposed Bid process to move forward.

However, UTU will be closely monitoring the distribution of straight shifts on a daily basis to ensure an equitable distribution of straight shifts. Accordingly, UTU hereby formally requests that it be provided on an ongoing basis the daily schedules of all Para Cruz employees. Specifically, UTU requests that each day, Metro provide to Art Zamudio and the Base Representative (at 1200 River Street) the previous day's schedule, with the 40% of the total number of all full time regular weekday straight shift passenger service assignments highlighted on the print-out.

Please be advised that the United Transportation Union Local 23 reserves its right to object to this imposed bid and that UTU will take the necessary legal action to prevent discriminatory practices in scheduling. Discriminatory practices would include, but not be limited to, a disproportionate share of straight shifts going to certain individuals or an individual being completely excluded from straight shifts.

2-b.1

Please confirm no later than Friday, October 6, that Metro agrees to provide this requested information in exchange for UTU's concessions as set forth in this letter.

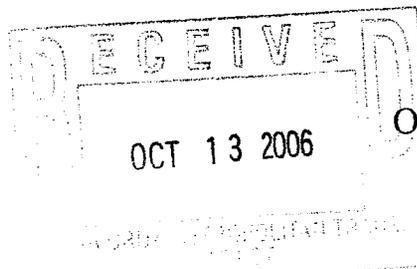
Respectfully,

A handwritten signature in black ink, appearing to read "Bonnie Morr", with a long horizontal flourish extending to the right.

Bonnie Morr, Chairperson
United Transportation Union Local 23

Cc S. Paulson
R. Slater
P. Gallagher
C. Aguirre
Board of Directors

2-6.2



October 11, 2006

SERVICE AUTHORITY
FOR FREEWAY
EMERGENCIES
(SAFE)

RAIL/TRAIL
AUTHORITY

Santa Cruz Metropolitan Transit District
370 Encinal, Suite 100
Santa Cruz, CA 95060

COMMUTE
SOLUTIONS

Dear Chair Rotkin:

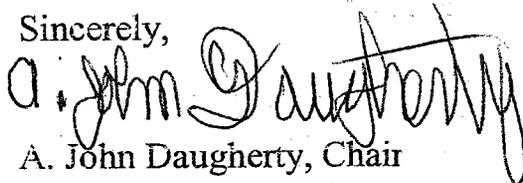
TRANSPORTATION
POLICY WORKSHOP

The Elderly & Disabled Transportation Advisory Committee (E/D TAC) advises the Santa Cruz County Regional Transportation Commission (SCCRTC) and the Santa Cruz Metropolitan Transit District (Metro) on transportation needs for people with disabilities, seniors and persons with limited means. The E/D TAC reviewed the summer 2006 edition of the Metro ParaCruz Customer Guide and had the following comments:

BUDGET &
ADMINISTRATION
PERSONNEL
COMMITTEE

The E/D TAC requests that the Guide be printed in an easily readable font in 14 point or bigger type.

INTERAGENCY
TECHNICAL
ADVISORY
COMMITTEE

Sincerely,


A. John Daugherty, Chair

BICYCLE COMMITTEE

Elderly and Disabled Transportation Advisory Committee

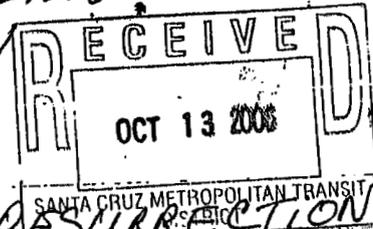
ELDERLY & DISABLED
TRANSPORTATION
ADVISORY COMMITTEE

cc: Les White, General Manager, Metro
Steve Paulson, Paratransit Administrator
Bob Yount, Chair, MAC

\\Rtoserv1\external\E&DTAC\OUTREACH2006\MetroGuide1006.doc

BRING BACK BUS # 65

METRO'S BUS SERVICE (THE #65) WITH STOPS, COMING & GOING, RIGHT AT OUR DOORSTEP FROM METRO CENTER DOWNTOWN TO CAPITOLA MALL WAS ELIMINATED APPROX. 2-3 YEARS AGO. THE '65 DROPPED US OFF A FEW FEET FROM OUR DOOR MAKING SHUFFLING & SHOPPING POSSIBLE - MAYBE LUNCH, BROWSING, AN INDEPENDENT AND LEISURELY TIME - OUT $\frac{1}{2}$ RETURNING HOME SAFELY!



SENIORS IN THIS NEIGHBORHOOD REQUIRE RESURRECTION OF THE SANTA CRUZ METROPOLITAN TRANSIT DISTRICT (METRO)'S #65 BUS ROUTE TO SERVICE OUR NEEDS. WE ARE HEREBY PETITIONING THE METRO BOARD OF DIRECTORS TO RECONSIDER WITH EMPHASIS ON THE DEPRIVATIONAL IMPACT THE ELIMINATION OF THE "65" HAS ON OUR LIVES.

e.e., Janet Smith 13

WE NEED SIGNATURES TO VERIFY THE NEED. PLEASE SIGN

NAME (██████████)

(MOVE OVER)
ADDRESS (STREET) →

2-d.1

FILE 101
LINDKEM

Name

Address

1 Francis Coleman

609 Frederick apt 104

2 Betty Holmes

609 Frederick St. #138 ^{SC} CA 95062

3 ANTOINE ZEINI

609 Frederick St #343 apt

4 Marilla Constantino

609 Frederick St apt 344

5 Rosa Minatale

609 Frederick St. Apt 270

6 Mrs Lucido

609 Frederick St. apt 164

7 Clara Fontenot

?

8 C. Borke

609 FREDERICK ST. #217
S. CRUZ, CA 95062

9 Samuel Mazurosky

609 FREDERICK ST. #255,
S.C., CA 95062

10 F. Villa Beech

609 Frederick St. ^{#330} SC. 95062.

11 Helen Linden

609 Frederick St #160

12 Dorothy Chait

609 Frederick St #353

13 Jeanne de Puant

609 Frederick St #231

14 Bonnie Pearson

609 Frederick St #257

15 Mitzi Metcalf

609 Frederick St. #169

16	Hilda C. Burchell	609 Frederick St, #315
17	Sandy Mittalia	609 Frederick St #154
18	Shirley Gibb	609 Frederick St. #264
19	Leslie Duplex	609 Frederick #248
20	Leonard W Gallagher	609 Frederick St #274
21	Alma Heath	609 Frederick St. 250
22	Jennis Long	720 Alma Avenue
23	Thos C Grogan	609 Frederick #301
24	Jewell Nowdeska	609 Frederick St #215
25	Tina Ferrarano	609 Frederick St
26	Cathy Yost	609 Frederick St #354
27	Lois Sloan	609 Frederick #345
28	Esther L Cowan	609 Frederick #347
29	Gene Graham	609 Frederick #249
30	Marian Lewis	609 Frederick St #165

31 ~~Henry~~ ~~King~~
32 ~~Erna~~ O'Reilly
33 Winona M^e Cormick
34 Richard ~~King~~
35 Nell Lela
36 Lynn Gallagher
37 Barbara Apolskis
38 Norma Leonard
39 Marge Specht
40 ~~John~~ ~~King~~
41 Martha Chesson
42 Glen Eldred
43 Anne A. Hamilton
44 ~~Jelly~~ McMillan
45 ~~James~~ Vargent

609 Frederick #309
609 Frederick St. #331
609 Frederick St. #338
609 " " 334
609 - Frederick 206
609 Frederick St #552
" " #242
609 Frederick St. #115
609 Frederick St #314
609 Frederick # 274
609 Frederick # 156
609 Frederick # 152
609 Frederick # 207
✓ ✓ #166
✓ ✓ L #342

47 Blima Menberg	609 Frederick St
48 Esther Shambly	609 Frederick St ^{apt 201}
49 Eleanor & Waring	609 Frederick St. #12
50 Joan Wook	609 Frederick St. #304
51 C. Borke	609 Frederick St. #217 Santa Cruz CA 95062
52 Joyce Belford	609 Frederick St #351 Santa Cruz, Calif. 95062
53.1 Cathy Weber	609 Frederick St #147 Santa Cruz - Ca 95062
54 Viken Davoud	# 449 Frederick St
55 Eddie Johnson	609 Frederick St Santa Cruz 95062
56 Jean O'Rourke	17th Ave Santa Cruz, Ca 95062
57 Joyce E. Brown	609 Frederick St 95062
58 Jane Hunter	609 Frederick St 95062
59 Viola Platt	609 Frederick St.
60 Opal Civetta	609 Frederick St. 95062.
61 Rosemarie Cross #167	609 Frederick St. 95062
62 Rose Wallace #144	609 Frederick St ;

63 John Vu

609 Frederick # 245-

64 ANTOINE ZEIND

609 Fredrick # 343

65 Carol Stone Og

Employed at 609 Fredrick #

Petition for the #65 bus

66 Lou Sloan #345 -

66 Francis Maupin #161

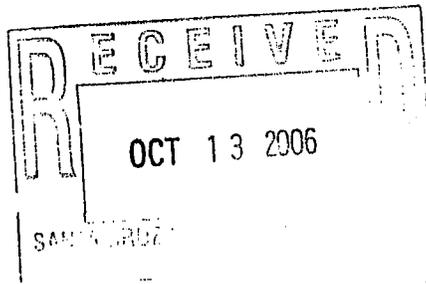
66 Frank O'Radley #331

Rosa Menzies

609 Frederick St. #270
Santa Cruz, Calif. 95062



Metro Board of Directors
370 Encinal St.
Santa Cruz, Calif. 95060



2-4.8

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Minutes- Board of Directors

September 8, 2006

A Regular Meeting of the Board of Directors of the Santa Cruz Metropolitan Transit District met on Friday, September 8, 2006 at the District's Administrative Office, 370 Encinal Street, Santa Cruz, CA.

Vice Chair Tavantzis called the meeting to order at 9:01 a.m.

SECTION 1: OPEN SESSION

1. ROLL CALL:

DIRECTORS PRESENT

Jan Beautz (arrived after roll call)
Michelle Hinkle
Mike Keogh
Emily Reilly
Mike Rotkin (arrived after roll call)
Pat Spence
Mark Stone
Marcela Tavantzis

DIRECTORS ABSENT

Dene Bustichi
Kirby Nicol
Dale Skillicorn
Ex-Officio Wes Scott

STAFF PRESENT

Ciro Agguire, Operations Manager	Steve Paulson, Paratransit Administrator
Mark Dorfman, Assistant General Manager	Elisabeth Ross, Finance Manager
Mary Ferrick, Base Superintendent	Robyn Slater, Human Resources Manager
Terry Gale, IT Manager	Tom Stickel, Maintenance Manager
Margaret Gallagher, District Counsel	Les White, General Manager

EMPLOYEES AND MEMBERS OF THE PUBLIC WHO VOLUNTARILY INDICATED THEY WERE PRESENT

Carolyn Chaney, Chaney & Associates	John Mellon, VMU
Carolyn Derwing, UTU	Sandra Lipperd, UTU
Jonathan Gifford, UCSC Student	Paul Marcelin-Sampson, MAC
Norm Hagen, MAC	Bob Yount, MAC

2. ORAL AND WRITTEN COMMUNICATION

Written:

a. George Dondero, Exec. Dir., SCCRTC Re: Public Transit Resources

5-1.1

Oral:

Jonathan Gifford, UCSC Student, stated that he believes METRO joining to sue UCSC regarding proposed campus expansion is a bad idea and said that UCSC service is not adequate. Mr. Gifford stated that METRO is to provide transportation to and from campus according to the contract, with TAPS shuttles providing on-campus transportation.

3. LABOR ORGANIZATION COMMUNICATIONS

None.

4. ADDITIONAL DOCUMENTATION TO SUPPORT EXISTING AGENDA ITEMS

None.

CONSENT AGENDA

5-1. APPROVE REGULAR BOARD MEETING MINUTES AUGUST 11 & 25, 2006

Will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-2. ACCEPT AND FILE PRELIMINARILY APPROVED CLAIMS FOR THE MONTH OF AUGUST 2006

No questions or comments.

5-3. ACCEPT AND FILE AUGUST 2006 RIDERSHIP REPORT

Pages 1 & 4 of the Ridership Report will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-4. CONSIDERATION OF TORT CLAIMS: DENY THE CLAIM OF AMERIPRISE (NGUYEN), CLAIM #06-0017

Margaret Gallagher reported that this matter had been settled and requested that it be deleted from the Agenda.

5-5. ACCEPT AND FILE THE METRO ADVISORY COMMITTEE (MAC) AGENDA FOR SEPTEMBER 20, 2006 AND MINUTES OF JULY 19, 2006

No questions or comments.

5-6. ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR MAY 2006 AND APPROVAL OF BUDGET TRANSFERS

Will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-1.2

5-7. ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR JUNE 2006; DESIGNATION OF EXCESS SALES TAX FUNDS; AND ADOPTION OF SCHEDULE OF RESERVE ACCOUNTS

Will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-8. ACCEPT AND FILE HIGHWAY 17 STATUS REPORT FOR JUNE 2006

No questions or comments.

5-9. ACCEPT AND FILE PARACRUZ OPERATIONS STATUS REPORT FOR THE MONTH OF JUNE 2006

No questions or comments.

5-10. ACCEPT AND FILE UNIVERSITY OF CALIFORNIA, SANTA CRUZ SERVICE UPDATE FOR MONTH OF JULY 2006

No questions or comments.

5-11. ACCEPT AND FILE MINUTES REFLECTING VOTING RESULTS FROM APPOINTEES TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR THE AUGUST 2006 MEETING(S)

Will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-12. ACCEPT AND FILE METROBASE STATUS REPORT

Will be included in the September 22, 2006 Board Packet.
No questions or comments.

5-13. CONSIDERATION OF AUTHORIZING THE DISPOSAL OF ONE 1986 SERVICE TRUCK, ONE 1985 SERVICE VAN, ONE 1986 SERVICE VAN, TWO (2) 1985 PICK-UP TRUCKS, AND ASSOCIATED PARTS

No questions or comments.

5-14. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT RENEWAL WITH CLAREMONT BEHAVIORAL SERVICES FOR EMPLOYEE ASSISTANCE PROGRAM

No questions or comments.

5-1.3

REGULAR AGENDA

6. PRESENTATION OF EMPLOYEE LONGEVITY AWARDS

This presentation will take place at the September 22, 2006 Board meeting.

7. PUBLIC HEARING: CONSIDERATION OF MODIFICATIONS TO THE PARATRANSIT PLAN REFERRED TO AS THE PARACRUZ CUSTOMER GUIDE

Public Hearing will take place at 9:00 a.m. at the September 22, 2006 Board meeting.

Summary:

Steve Paulson reported that this version of the modified Customer Guide included input from MAC, E&D TAC, and others and pointed out the following three modified areas of importance:

- 1) How Will-Call Returns are handled and that they are available up until 7:00 p.m.,
- 2) Advance reservations reduced from 14 days ahead of trip to 3 days,
- 3) Multiple reservations per phone call reduced from 4 round-trips to 3

DIRECTOR BEAUTZ ARRIVED

Discussion:

Director Keogh asked MAC members Paul Marcelin-Sampson and Bob Yount if MAC feels METRO is going in the right direction with the proposed modifications. They replied affirmatively.

Director Reilly suggested adding language on Page #7.a6 clarifying that ParaCruz rides must begin and end within $\frac{3}{4}$ mile of a fixed route bus line.

Paul Marcelin-Sampson pointed out that up to 1,400 more rides per month are reserved than taken, as shown on Page #5-9.2 of the Paratransit Report, which is why MAC suggested reducing advance reservations from 14 to 3 days. Mr. Marcelin-Sampson stated that MAC also feels METRO is too lenient regarding appointments running late and impacting ParaCruz schedules. MAC feels there should be some kind of mechanism to track changed pick up and drop off times and some sort of penalty after a certain number of incidents.

MAC Chair Bob Yount stated that MAC members had put a lot of time and effort into making suggestions for improving the Customer Guide.

MAC Vice Chair Norm Hagen agreed and stated that he is a paratransit user and feels that many customers' expectations are unrealistic.

There was a discussion about appointments running late and how to handle them.

Direction: Vice Chair Tavantzis directed that the number of customers not ready during their "ready window" for return trips be identified on the monthly ParaCruz Status Report and, if possible, that they be separated between the ones that called or not. Vice Chair Tavantzis also

5-1.4

directed that the number of customer-missed rides be tracked to see if there is an improvement with the 3-day advance appointment window.

Director Hinkle suggested that the ready window be explained orally to customers during their orientation to the system.

8. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE PURCHASE OF AN EMERGENCY GENERATOR FOR THE ENCINAL OFFICES

Summary:

Tom Stickel reported that the current generator servicing the Encinal Street Offices no longer adequately serves the power requirements of the District's Information Technology needs in the event of a power failure or disruption.

ACTION: MOTION: DIRECTOR REILLY SECOND: DIRECTOR STONE

Authorize the General Manager to execute a contract for one each 40 KW skid-mounted enclosed gaseous engine generator set for the Encinal Street Offices with State Electric

Motion passed unanimously with Directors Bustichi, Nicol, and Skillicorn being absent.

9. CONSIDERATION OF APPROVAL OF CALPERS RESOLUTIONS TO FIX THE DISTRICT'S MEDICAL PREMIUM CONTRIBUTION RATES FOR SEIU AND UTU FIXED ROUTE

Summary:

Roby Slater reported that these two Resolutions with CalPERS will establish the maximum monthly premium contributions that METRO pays for SEIU and UTU Fixed Route and will change the fixed dollar amount to a percentage to reflect the current Labor Agreements.

DIRECTOR STONE LEFT THE MEETING

Discussion:

John Mellon, VMU, noted that the Staff Report's Recommended Action had an error listing SEIU as "Local 23" rather than "Local 415".

ACTION: MOTION: DIRECTOR REILLY SECOND: DIRECTOR KEOGH

Adopt Resolutions to revise the District's fixed contribution rates for the Service Employees International Union, Local 415, and the United Transportation Union, Local 23, Fixed Route Division under the California Public Employees' Retirement System (CalPERS) medical insurance program

5-1.5

Motion passed by unanimous affirmative voice vote in lieu of a roll call vote with Directors Bustichi, Nicol, Skillicorn, and Stone being absent.

10. ACCEPT REPORT ON FEDERAL LEGISLATION FROM CAROLYN CHANEY OF CHANEY & ASSOCIATES, WASHINGTON, DC

Les White introduced METRO's Federal Legislative Lobbyist, Carolyn Chaney, of Chaney & Associates, Washington DC, and prefaced her presentation by expressing his appreciation for her efforts.

DIRECTOR STONE RETURNED TO THE MEETING

Ms. Chaney gave an update on federal legislation and its effect on METRO.

CHAIR ROTKIN ARRIVED

11. REVIEW OF ITEMS TO BE DISCUSSED IN CLOSED SESSION: District Counsel

Margaret Gallagher reported that that the Board would have a conference with its Legal Counsel regarding one case of existing litigation

12. ORAL AND WRITTEN COMMUNICATIONS REGARDING CLOSED SESSION

None.

SECTION II: CLOSED SESSION

Vice Chair Tavantzis adjourned to Closed Session at 10:26 a.m. and reconvened to Open Session at 11:12 a.m.

SECTION III: RECONVENE TO OPEN SESSION

13. REPORT OF CLOSED SESSION

Margaret Gallagher reported that the Board took no reportable action in Closed Session.

ADJOURN

There being no further business, Vice Chair Tavantzis adjourned the meeting at 11:13 a.m.

Respectfully submitted,



CINDI THOMAS
Administrative Services Coordinator

5-1.6

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Minutes- Board of Directors

September 22, 2006

A Regular Meeting of the Board of Directors of the Santa Cruz Metropolitan Transit District met on Friday, September 22, 2006 at the Santa Cruz City Council Chambers, 809 Center Street, Santa Cruz, CA.

Chair Rotkin called the meeting to order at 9:02 a.m.

SECTION 1: OPEN SESSION

1. ROLL CALL:

DIRECTORS PRESENT

Jan Beautz (arrived after roll call)
Dene Bustichi
Michelle Hinkle
Mike Keogh
Kirby Nicol
Emily Reilly (arrived after roll call)
Mike Rotkin
Dale Skillicorn
Pat Spence
Mark Stone
Marcela Tavantzis
Ex-Officio Wes Scott

DIRECTORS ABSENT

None

STAFF PRESENT

Frank Cheng, MetroBase Project Manager
Mark Dorfman, Assistant General Manager
Mary Ferrick, Base Superintendent
Margaret Gallagher, District Counsel
Steve Paulson, Paratransit Administrator

Elisabeth Ross, Finance Manager
Robyn Slater, Human Resources Manager
Tom Stickel, Maintenance Manager
Les White, General Manager

EMPLOYEES AND MEMBERS OF THE PUBLIC WHO VOLUNTARILY INDICATED THEY WERE PRESENT

Norm Hagen, MAC
Christine Jones, Transit Supervisor
Paul Marcelin-Sampson, Metro Riders Union
John Mellon, VMU

Manuel Osorio, Cabrillo College
Ivan Rusch, Transit User
Amy Weiss, Spanish Interpreter
Bob Yount, MAC

5-1.7

2. ORAL AND WRITTEN COMMUNICATION

Written:

- | | | |
|----|------------------------------------|-------------------------------|
| a. | George Dondero, Exec. Dir., SCCRTC | Re: Public Transit Resources |
| b. | <u>Louise Barnes</u> | Re: <u>Service Complaints</u> |
| c. | <u>Patricia A. Spence</u> | Re: <u>TFTF Resignation</u> |

Paul Marcelin-Sampson, Metro Riders Union, distributed a letter to the Board that he submitted to MST regarding Proposed Monterey Peninsula Service Realignment, which is attached to the file copy of these minutes. Chair Rotkin stated that this letter would be included in the next Board Packet and that Staff would respond to it prior to that time.

Les White reported that Staff would continue to respond to the specific service issues raised in Ms. Barnes' letters, however, her letters continue to be racially offensive and not constructive.

Oral:

Ivan Rusch, Transit User, asked when 3-bike racks would be installed on local routes. Mark Dorfman responded that METRO is currently working with the vendor and offered to contact Mr. Rusch with details.

Paul Marcelin-Sampson, Metro Riders Union, stated that Ms. Barnes' letters were very offensive, not constructive and not worthy of a response. Mr. Marcelin-Sampson urged the Board to pressure SCCRTC Staff to address the TFTF meeting accessibility issues raised in Director Spence's letter causing her resignation, and he thanked METRO Staff for the quick response to MST's short-notice service reduction mentioned in the letter he distributed at today's meeting.

DIRECTORS REILLY AND BEAUTZ ARRIVED

Norm Hagen, MAC, stated that he was appalled at Ms. Barnes' letter, which he feels is completely unwarranted, and he commended METRO's fixed route and ParaCruz operators for their professional manner.

Director Keogh requested that the Director Spence's letter regarding that accessibility of the TFTF meetings be on the next Board Agenda and that another representative be appointed if the issue is not resolved. Director Keogh stated that the SCCRTC read the letter at their meeting yesterday and are aware of the situation.

Director Beautz added that it would be helpful to suggest to the SCCRTC accessible meeting locations for the TFTF.

3. LABOR ORGANIZATION COMMUNICATIONS

None.

4. ADDITIONAL DOCUMENTATION TO SUPPORT EXISTING AGENDA ITEMS

Page 1 of the August Ridership Report and a draft APTA Annual Conference bus pass were distributed today and are attached to the file copy of these minutes.

5-1.8

DIRECTOR BEAUTZ ARRIVED

SECTION I:

OPEN SESSION:
ADD TO ITEM #2

ORAL AND WRITTEN COMMUNICATION
(Insert new Written Communication)

CONSENT AGENDA:
ADD TO ITEM #5-1

APPROVE REGULAR BOARD MEETING MINUTES OF AUGUST 11 & 25, 2006

(Insert Minutes)

ADD TO ITEM #5-3

ACCEPT AND FILE AUGUST 2006 RIDERSHIP REPORT

(Insert Page 4)

(Page 1 will be distributed at the September 22, 2006 Board Meeting)

ADD TO ITEM #5-4

CONSIDERATION OF TORT CLAIMS

(Delete Claim #06-0017; Insert Claim #06-0025)

ADD TO ITEM #5-5

ACCEPT AND FILE THE METRO ADVISORY COMMITTEE (MAC) AGENDA FOR SEPTEMBER 20, 2006 AND MINUTES OF JULY 19, 2006

(Replace existing Agenda with REVISED Agenda)

INSERT ITEM #5-6

ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR MAY 2006 AND APPROVAL OF BUDGET TRANSFERS

(Insert Staff Report)

INSERT ITEM #5-7

ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR JUNE 2006; DESIGNATION OF EXCESS SALES TAX FUNDS IN THE AMOUNT OF \$649,817 FOR CARRYOVER IN THE FY 06-07 BUDGET, \$143,221 FOR LIABILITY INSURANCE RESERVES, \$434,812 FOR WORKERS' COMPENSATION RESERVES; \$77,697 FOR BUS OPERATOR WAGE ADJUSTMENT RESERVES, AND THE REMAINDER, IF ANY, FOR CAPITAL RESERVES; AND ADOPTION OF SCHEDULE OF RESERVE ACCOUNTS

(TITLE AMENDED FROM SEPTEMBER 8, 2006 AGENDA)

(Insert Staff Report)

INSERT ITEM #5-11

ACCEPT AND FILE MINUTES REFLECTING VOTING RESULTS FROM APPOINTEES TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR THE AUGUST 2006 MEETING(S)

(Insert Staff Report)

INSERT ITEM #5-12

ACCEPT AND FILE METROBASE STATUS REPORT

(Insert Staff Report)

ADD ITEM #5-16

CONSIDERATION OF SUPPORT FOR THE CITY OF SANTA CRUZ GRANT APPLICATION FOR A BAY CORRIDOR MULTI-MODAL PLANNING STUDY

(Insert Staff Report)

5-1.9

- ADD ITEM #5-17** **CONSIDERATION OF APPROVAL OF PARATRANSIT CLASS SPECIFICATION (JOB DESCRIPTION) FOR PARATRANSIT DISPATCHER**
(Insert Staff Report)
- ADD ITEM #5-18** **ACCEPT AND FILE NOTIFICATION OF ACTIONS TAKEN IN CLOSED SESSION REGARDING THE SALE OF REAL PROPERTY LOCATED AT 25 SAKATA LANE, WATSONVILLE, CA**
(Insert Notice)
- ADD ITEM #5-19** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A NEW LEASE WITH FARINOSH SALILI FOR SUITE C AT PACIFIC STATION**
(Insert Staff Report)
- REGULAR AGENDA:**
REPLACE ITEM #7 **PUBLIC HEARING: CONSIDERATION OF MODIFICATIONS TO THE PARATRANSIT PLAN REFERRED TO AS THE PARACRUZ CUSTOMER GUIDE**
(Replace existing Staff Report with **REVISED** Staff Report)
- DELETE ITEM #8** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE PURCHASE OF AN EMERGENCY GENERATOR FOR THE ENCINAL OFFICES**
(Deleted: Action taken at the September 8, 2006 Board Meeting)
- DELETE ITEM #10** **ACCEPT REPORT ON FEDERAL LEGISLATION FROM CAROLYN CHANEY OF CHANEY & ASSOCIATES, WASHINGTON, DC**
(Deleted: Presentation took place at the September 8, 2006 Board Meeting)
- ADD ITEM #11** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE PREPARATION OF A SHORT RANGE TRANSIT PLAN**
(Insert Staff Report)
- ADD ITEM #12** **CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE REPLACEMENT OF THE SLIDING AND SWING DOORS AT PACIFIC STATION**
(Insert Staff Report)
- ADD ITEM #13** **CONSIDERATION OF ADOPTING POSITIONS OF SUPPORT FOR STATE BALLOT PROPOSITIONS 1A, 1B, 1C, 87, AND A POSITION OF OPPOSITION FOR PROPOSITION 90**
(Insert Staff Report)

CONSENT AGENDA

- 5-1. APPROVE REGULAR BOARD MEETING MINUTES AUGUST 11 & 25**
5-2. ACCEPT AND FILE PRELIMINARILY APPROVED CLAIMS FOR THE MONTH OF AUGUST 2006
5-3. ACCEPT AND FILE AUGUST 2006 RIDERSHIP REPORT

5-1.10

- 5-4. CONSIDERATION OF TORT CLAIMS: DELETED: SETTLEMENT REACHED (DENY THE CLAIM OF AMERIPRISE (NGUYEN), CLAIM #06-0017)
DENY THE CLAIM OF COUNTY OF SANTA CRUZ, CLAIM #06-0025
- 5-5. ACCEPT AND FILE THE METRO ADVISORY COMMITTEE (MAC) AGENDA FOR SEPTEMBER 20, 2006 AND MINUTES OF JULY 19, 2006
- 5-6. ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR MAY 2006 AND APPROVAL OF BUDGET TRANSFERS
- 5-7. ACCEPT AND FILE MONTHLY BUDGET STATUS REPORT FOR JUNE 2006; DESIGNATION OF EXCESS SALES TAX FUNDS IN THE AMOUNT OF \$649,817 FOR CARRYOVER IN THE FY 06-07 BUDGET, \$143,221 FOR LIABILITY INSURANCE RESERVES, \$434,812 FOR WORKERS' COMPENSATION RESERVES; \$77,697 FOR BUS OPERATOR WAGE ADJUSTMENT RESERVES, AND THE REMAINDER, IF ANY, FOR CAPITAL RESERVES; AND ADOPTION OF SCHEDULE OF RESERVE ACCOUNTS (Title amended from September 8, 2006 Agenda)
- 5-8. ACCEPT AND FILE HIGHWAY 17 STATUS REPORT FOR JUNE 2006
- 5-9. ACCEPT AND FILE PARACRUZ OPERATIONS STATUS REPORT FOR THE MONTH OF JUNE 2006
- 5-10. ACCEPT AND FILE UNIVERSITY OF CALIFORNIA, SANTA CRUZ SERVICE UPDATE FOR MONTH OF JULY 2006
- 5-11. ACCEPT AND FILE MINUTES REFLECTING VOTING RESULTS FROM APPOINTEES TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION FOR THE AUGUST 2006 MEETING(S)
- 5-12. ACCEPT AND FILE METROBASE STATUS REPORT
- 5-13. CONSIDERATION OF AUTHORIZING THE DISPOSAL OF ONE 1986 SERVICE TRUCK, ONE 1985 SERVICE VAN, ONE 1986 SERVICE VAN, TWO (2) 1985 PICK-UP TRUCKS, AND ASSOCIATED PARTS
- 5-14. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT RENEWAL WITH CLAREMONT BEHAVIORAL SERVICES FOR EMPLOYEE ASSISTANCE PROGRAM
- 5-15. CONSIDERATION OF APPROVAL OF CALPERS RESOLUTIONS TO FIX THE DISTRICT'S MEDICAL PREMIUM CONTRIBUTION RATES FOR SEIU AND UTU FIXED ROUTE
(Moved to Consent Agenda at the September 8, 2006 Board Meeting. Retained original numbering as Item #9)
- 5-16. CONSIDERATION OF SUPPORT FOR THE CITY OF SANTA CRUZ GRANT APPLICATION FOR A BAY CORRIDOR MULTI-MODAL PLANNING STUDY
- 5-17. CONSIDERATION OF APPROVAL OF PARATRANSIT CLASS SPECIFICATION (JOB DESCRIPTION) FOR PARATRANSIT DISPATCHER
- 5-18. ACCEPT AND FILE NOTIFICATION OF ACTIONS TAKEN IN CLOSED SESSION REGARDING THE SALE OF REAL PROPERTY LOCATED AT 25 SAKATA LANE, WATSONVILLE, CA
- 5-19. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A NEW LEASE WITH FARINOSH SALILI FOR SUITE C AT PACIFIC STATION

5-1.11

ACTION: MOTION: DIRECTOR SKILLICORN SECOND: DIRECTOR REILLY

Approve the Consent Agenda

Motion passed by unanimous affirmative voice vote in lieu of a roll call vote for Item #5-15 with all Directors present.

REGULAR AGENDA

6. PRESENTATION OF EMPLOYEE LONGEVITY AWARDS

The following employees were awarded longevity certificates for their years of service:

TEN YEARS

Brenda J. Blevins, Sr. Accounting Technician
Christine M. Jones, Transit Supervisor

7. PUBLIC HEARING: CONSIDERATION OF MODIFICATIONS TO THE PARATRANSIT PLAN REFERRED TO AS THE PARACRUZ CUSTOMER GUIDE

Summary:

Steve Paulson reported that the Board is being asked to adopt the most recent revision of the ParaCruz Customer Guide, which is METRO's Paratransit Plan. The revision process took approximately four months and great input has been received from MAC and the public. The latest revision is clearer, more readable, and customer-friendly than it previously was.

Mr. Paulson pointed out the following notable items included in this revision:

- 1) Clarification that ParaCruz is not a taxi service
- 2) New section covers Natural Disasters

Mr. Paulson reported that the following items would be added to the final revision:

- 1) A statement that the Customer Guide is METRO's Paratransit Plan
- 2) MAC will be identified as METRO's official advisory body

Mr. Paulson explained that the new guide would be distributed by a full mailing and available on all vehicles, at the Stroke Center, all dialysis centers, all service agencies, and by request. Available formats will include large-print and Braille and the Braille transcription will be provided to METRO free of charge.

Discussion:

Director Skillicorn stated that he would like to see accommodations made for weather related same-day changes of mobility devices when possible in the future. Les White replied that this type of accommodation could be considered when all of METRO's smaller Paratransit vehicles are replaced with larger vehicles and it would not impact the service.

5-1.12

Director Spence and Norm Hagen added that only the controls of electric mobility devices need to be protected from the weather.

CHAIR ROTKIN OPENED THE PUBLIC HEARING AT 9:40 A.M.

Paul Marcelin-Sampson commended Steve Paulson for the level of public outreach in the process of developing this document. Mr. Marcelin-Sampson suggested that if a full mailing cannot be done, that a one-page large-print notification be mailed out announcing that the Customer Guide has been updated and instructions on how to obtain a copy. Mr. Marcelin-Sampson stated that he supports MAC being named the official advisory body, identifying the Customer Guide as the District's Paratransit Plan, and strongly supports the three-day advance reservation policy to reduce the no-show situation.

Norm Hagen stated that he supports the three-day advance reservation policy and added that METRO is providing above and beyond what the ADA requires.

Bob Yount reported that although every MAC member contributed to this guide, he felt that E&D/TAC did not take it seriously or make comments on it.

CHAIR ROTKIN CLOSED THE PUBLIC HEARING AT 9:49 A.M.

Discussion:

Director Stone thanked MAC for all the time and effort they put into these modifications.

Director Spence pointed out that page numbers were missing and that there were punctuation errors and typos in the document. Chair Rotkin replied that Staff has the authority to make those types of corrections without substantive changes.

Director Spence asked that the Eligibility categories on page #7.a23 be reviewed because the ADA lists more categories. Director Spence asked if the Suggested Changes that begin on page #7.b1 are all the changes that were made. Steve Paulson replied that Attachment B lists all input received. Director Spence asked why the language listed on page #7.b9 regarding steep slopes was not included in the document. Mr. Paulson responded that the last line on page #7.a16 was included to address this and the language is less restrictive. Regarding page #7.a20, Director Spence asked if the smoking distance was 40 feet or 50 feet. Mr. Paulson replied that District policy is 40 feet.

Les White suggested changing the word "Eligibility" on page #7.a23 that Director Spence mention, as this section relates to people who are already certified as eligible to use Paratransit service.

ACTION: MOTION: DIRECTOR SPENCE SECOND: DIRECTOR TAVANTZIS

Approve modifications to the Paratransit Plan referred to as the ParaCruz Customer Guide, including adding a statement identifying the Customer Guide as METRO's Paratransit Plan, identifying MAC as METRO's official advisory body, and changing the word "Eligibility" on page #7.a23

5-1.13

Motion passed unanimously with all Directors present.

11. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE PREPARATION OF A SHORT RANGE TRANSIT PLAN

Summary:

Mark Dorfman reported that a Short Range Transit Plan (SRTP) is required by the federal government as a condition of receiving transit assistance funds. METRO's last full SRTP was completed in 1997 and the FTA has been prodding METRO to update its plan. Staff is recommending that the Board award the contract to Wilbur Smith Associates to develop a STRP for an amount not to exceed \$97,815.

FTA 5303 grant funds though AMBAG will pay \$85,000 toward contract costs, with the District paying the remaining \$12,815 in required matching funds from capital reserves.

Existing METRO Staff will be trained to be able to develop future STRPs and keep them updated going forward.

ACTION: MOTION: DIRECTOR STONE SECOND: DIRECTOR ROTKIN

Authorize the General Manager to execute a contract for the preparation of a Short Range Transit Plan with Wilbur Smith Associates

Motion passed unanimously with all Directors present.

12. CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO EXECUTE A CONTRACT FOR THE REPLACEMENT OF THE SLIDING AND SWING DOORS AT PACIFIC STATION

Summary:

Tom Stickel reported that the sliding and swing doors at Pacific Station are worn out and in poor condition and that the doors are frequently inoperative in the automatic mode.

ACTION: MOTION: DIRECTOR REILLY SECOND: DIRECTOR STONE

Authorize the General Manager to execute a contract for replacement of the sliding and swinging doors at Pacific Station with Automatic Door Systems, Inc.

Motion passed unanimously with all Directors present.

13. CONSIDERATION OF ADOPTING POSITIONS OF SUPPORT FOR STATE BALLOT PROPOSITIONS 1A, 1B, 1C, 87, AND A POSITION OF OPPOSITION FOR PROPOSITION 90

5-1.14

Summary:

Les White reported that on November 7th, voters will be asked to consider a number of State Ballot Propositions, several of which directly affect METRO. Staff recommends that the Board adopt positions of support for Propositions 1A, 1B, 1C & 87 and a position of opposition for Proposition 90. Mr. White gave a brief description of each proposition and how it affected METRO:

- 1A – would provide protection for sales tax revenue on fuel
- 1B – would authorize approximately \$19.9 billion to support transportation projects
- 1C – would authorize approximately \$2.9 billion in housing projects, including approximately \$300 million for projects such as METRO's Pacific Station Redevelopment
- 87 – would establish 1.5% variable tax on oil producers
- 90 – would restrict how public agencies use Eminent Domain authority

Discussion:

Paul Marcelin-Sampson thanked Mr. White for his review and political overview of these propositions and suggested that a METRO put a flyer on the buses before the elections educating the public on these propositions and the consequences of voting for or against them.

Manuel Osorio, Cabrillo College, thanked Mr. White and urged the Board to support Proposition 87.

Norm Hagen suggested publishing METRO's position on these propositions in the Sentinel and Register Pajaronian.

Director Scott thanked Mr. White and agreed that METRO's position should be made public before elections.

Directors Nicol and Bustichi suggested taking separate votes rather than voting on all five propositions at once.

Director Keogh stated that he supports the Staff recommendation and voting on 1A, B, & C, but feels METRO should not be taking any action on 87 or 90.

Chair Rotkin divided the motion into three parts as follows:

ACTION: MOTION: DIRECTOR SKILLICORN SECOND: DIRECTOR BEAUTZ

Adopt positions of support for State Ballot Propositions 1A, 1B, & 1C

Motion passed unanimously with all Directors present.

5-1.15

ACTION: MOTION: DIRECTOR STONE SECOND: DIRECTOR REILLY

Adopt position of support for State Ballot Proposition 87

Motion passed with Directors Hinkle, Reilly, Rotkin, Skillicorn, Spence, Stone, and Tavantzis voting yes and Directors Beautz, Bustichi, Keogh and Nicol voting no.

ACTION: MOTION: DIRECTOR REILLY SECOND: DIRECTOR BEAUTZ

Adopt position of opposition for State Ballot Proposition 90

Motion passed with Directors Beautz, Bustichi, Hinkle, Nicol, Reilly, Rotkin, Skillicorn, Spence, Stone, and Tavantzis voting yes and Director Keogh voting no.

Discussion:

There was a discussion regarding getting educational information out to the public in a non-biased way prior to elections. Chair Rotkin stated that Staff would issue a press release.

14. REVIEW OF ITEMS TO BE DISCUSSED IN CLOSED SESSION: District Counsel

Chair Rotkin reported that the Board would have a conference with its Labor Negotiators regarding SEIU, Local 415 and UTU, Local 23, ParaCruz Division, and that the Board would have a conference with its Legal Counsel regarding two cases of existing litigation.

Les White requested that the Board include an additional case of Anticipated Litigation under Item #3a on today's Closed Session Agenda. Margaret Gallagher reported that Staff received information after the Agenda was posted and there is a need to discuss it prior to the next Board meeting.

ACTION: MOTION: DIRECTOR REILLY SECOND: DIRECTOR BEAUTZ

Make the necessary findings to add this item to today's Closed Session Agenda

Motion passed unanimously with all Directors present.

15. ORAL AND WRITTEN COMMUNICATIONS REGARDING CLOSED SESSION

SECTION II: CLOSED SESSION

Chair Rotkin adjourned to Closed Session at 10:45 a.m. and reconvened to Open Session at 11:45 a.m.

SECTION III: RECONVENE TO OPEN SESSION

5-1.16

16. REPORT OF CLOSED SESSION

Margaret Gallagher reported that the Board took no reportable action in Closed Session.

ADJOURN

There being no further business, Chair Rotkin adjourned the meeting at 11:46 a.m.

Respectfully submitted,



CINDI THOMAS
Administrative Services Coordinator

DRAFT

5-1.17

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 CHECK JOURNAL DETAIL BY CHECK NUMBER
 ALL CHECKS FOR COAST COMMERCIAL BANK

DATE: 09/01/06 THRU 09/30/06

CHECK NUMBER	CHECK DATE	CHECK AMOUNT	VENDOR	VENDOR NAME	VENDOR TRANS. TYPE	TRANS. NUMBER	TRANSACTION DESCRIPTION	TRANSACTION AMOUNT	COMMENT
19441	09/01/06	492.45	001	SBC		9216	AUG REPEATERS/OPS	406.11	
						9217	AUG PHONES/OPS	86.34	
19442	09/01/06	14.94	001025	COUNTY OF SANTA CRUZ		9218	SHELTER REMOVAL	14.94	
19443	09/01/06	2,380.23	001038	TWINVISION NA INC.		9308	REV VEH PARTS	2,380.23	
19444	09/01/06	10,438.26	001043	VISION SERVICE PLAN		9219	SEPT. VISION INS.	10,438.26	
19445	09/01/06	4,224.13	001063	NEW FLYER INDUSTRIES LIMITED		9309	REV VEH PARTS 2093	2,092.65	
						9310	REV VEH PARTS 249	249.13	
						9311	REV VEH PARTS 6	6.00	
						9312	REV VEH PARTS 249	249.13	
						9313	REV VEH PARTS 1066	1,066.36	
						9314	REV VEH PARTS 561	560.86	
19446	09/01/06	539.00	001093	KROLL LABORATORY SPECIALISTS		9220	7/1-7/25 DRUG TESTS	539.00	
19447	09/01/06	584.44	001230	CAPITOL CLUTCH & BRAKE, INC.		9315	REV VEH PARTS	584.44	
19448	09/01/06	75,682.12	001316	DEVCO OIL		9316	8/15-8/31 FUEL FLT	75,682.12	
19449	09/01/06	889.20	001379	SAFETY-KLEEN SYSTEMS, INC.		9221	HAZ WASTE DISPOSAL	889.20	
19450	09/01/06	213.22	001454	MONTEREY BAY OFFICE PRODUCTS		9317	5/15-8/14 COPY MAINT	213.22	
19451	09/01/06	138.46	001555	MAC TOOLS INC		9318	PARTS/SUPP/SM TOOL	138.46	
19452	09/01/06	114.43	001627	NEW PIG CORPORATION		9222	SAFETY SUPPLIES 104	114.43	
19453	09/01/06	418.50	001752	THOMPSON PUBLISHING GROUP, INC.		9223	FAIR LABOR HNBK/FIN	418.50	
19454	09/01/06	480.72	002063	COSTCO		9224	OFFICE SUPPLIES/PT	39.05	
						9225	OFFICE SUPPLIES/FAC	351.19	
						9226	PHOTO PROCESS/LEGAL	18.62	
						9319	PHOTO PROC OPS	12.04	
						9320	PHOTO PROC OPS	27.69	
						9321	PHOTO PROC OPS	32.13	
19455	09/01/06	27,939.60	002295	FIRST ALARM		9322	JULY SECURITY	27,939.60	
19456	09/01/06	2,795.84	002313	HARTSELL & OLIVIERI	7	9228	TRANSCRIPTS/HRD	1,804.11	
						9229	TRANSCRIPTS/HRD	991.73	
19457	09/01/06	23.96	002447	SETON IDENTIFICATION PRODUCTS		9230	NAMEPLATE/ADM 9	23.96	
19458	09/01/06	603.44	002504	TIFCO INDUSTRIES		9323	PARTS & SUPPLIES	603.44	
19459	09/01/06	32.00	002567	DEPARTMENT OF JUSTICE		9227	JULY FINGERPRINTS	32.00	
19460	09/01/06	399.00	002570	LEADERSHIP DIRECTORIES, INC.		9231	CONGRESS YELLOW BK	399.00	
19461	09/01/06	671.15	002624	DIGITAL RECORDERS		9324	REV VEH PARTS	671.15	
19462	09/01/06	3,800.86	002627	CDW GOVERNMENT, INC.		9232	OFFICE EQUIPMENT/IT	3,800.86	
19463	09/01/06	84.21	002689	B & B SMALL ENGINE		9234	REPAIRS/MAINTENANCE	84.21	
19464	09/01/06	1,040.53	002713	SANTA CRUZ AUTO TECH, INC.		9235	OUT RPR REV VEH/PT	823.32	
						9325	OUT RPR #8020	217.21	
19465	09/01/06	962.94	002721	NEXTEL COMMUNICATIONS		9233	7/4-8/3 PHONES/PT	962.94	
19466	09/01/06	973.31	002802	BATTERY SYSTEMS		9326	REV VEH PARTS	973.31	
19467	09/01/06	730.59	002805	TELEPATH CORPORATION		9327	OUT RPR EQUIP	730.59	
19468	09/01/06	472.17	002820	AMERICAN TRUCK & TRILER BODY CO		9236	REPAIRS/MAINTENANCE	162.75	
						9328	REV VEH PARTS	183.71	
						9329	REV VEH PARTS	125.71	
19469	09/01/06	25.52	002822	PACER SERVICE CENTER		9237	PROF.SVCS.	25.52	
19470	09/01/06	110.77	002828	ALLIED ELECTRONICS		9330	REV VEH PARTS	110.77	
19471	09/01/06	3,842.70	002829	VALLEY POWER SYSTEMS, INC.		9331	REV VEH PARTS	1,830.23	
						9332	REV VEH PARTS	1,039.20	
						9333	REV VEH PARTS	196.81	
						9334	REV VEH PARTS	776.46	
19472	09/01/06	627.00	002847	STATE OF CA-EDD		9238	PARADISE LEVY	627.00	

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
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19473	09/01/06	1,844.50	002866	THE MERCURY NEWS		9239	JULY ADVERTISING	1,844.50	
19474	09/01/06	3,391.22	009	PACIFIC GAS & ELECTRIC		9240	6/14-8/10 KINGS VLG	2,282.97	
						9241	7/16-8/14 RESEARCH	1,108.25	
19475	09/01/06	69.17	013	MCI SERVICE PARTS, INC.		9335	REV VEH PARTS	69.17	
19476	09/01/06	427.80	020	ADT SECURITY SERVICES INC.		9242	SEPT ALARMS	427.80	
19477	09/01/06	41.36	036	KELLY-MOORE PAINT CO., INC.		9243	REPAIRS/MAINTENANCE	41.36	
19478	09/01/06	337.50	039	KINKO'S INC.		9244	VIDEO CONFERENCE HRD	337.50	
19479	09/01/06	2,344.42	041	MISSION UNIFORM		9245	JULY UNIF/LAUN/FAC	369.19	
						9246	JULY UNIF/LAUN/FAC	73.28	
						9247	JULY UNIF/LAUNRY/PT	113.80	
						9336	JULY UNIF/LAUND FLT	1,788.15	
19480	09/01/06	146.14	050	PITNEY BOWES INC.		9248	10/1-12/31 METER	146.14	
19481	09/01/06	109.32	061A	REGISTER PAJARONIAN		9337	CLASS ADV-FLT	109.32	
19482	09/01/06	28.44	074	KENVILLE LOCKSMITHS	7	9283	JULY LOCKS/KEYS	28.44	
19483	09/01/06	21.27	079	SANTA CRUZ MUNICIPAL UTILITIES		9249	7/1-7/31 LANDFILL	21.27	
19484	09/01/06	1,148.01	085	DIXON & SON TIRE, INC.		9250	JULY TIRES/TUBES/PT	1,148.01	
19485	09/01/06	193.54	115	SNAP-ON INDUSTRIAL		9338	EMP TOOL REPLACE	193.54	
19486	09/01/06	722.61	117	GILLIG CORPORATION		9339	OTHER MOBILE SUPP	722.61	
19487	09/01/06	40.50	123	BAY PHOTO LAB		9251	PHOTO PROCESS/PT	40.50	
19488	09/01/06	697.88	149	SANTA CRUZ SENTINEL		9252	JULY ADVERTISING/ADM	102.35	
						9253	JULY ADVERTISING	299.75	
						9340	JULY ADV/FLT	295.78	
19489	09/01/06	6,341.98	157	DELL MARKETING L.P.		9254	OFFICE EQUIPMENT/IT	6,341.98	
19490	09/01/06	1,137.94	161	OCEAN CHEVROLET		9255	REV VEH PARTS/PT	1,046.76	
						9341	REV VEH PARTS FLT	91.18	
19491	09/01/06	732.17	166	HOSE SHOP, THE		9256	REPAIRS/MAINTENANCE	121.62	
						9342	PARTS & SUPPLIES	128.21	
						9343	REV VEH PARTS/SUPP	482.34	
19492	09/01/06	195.52	170	TOWNSEND'S AUTO PARTS		9344	REV VEH PARTS	195.52	
19493	09/01/06	262.66	172	CENTRAL WELDER'S SUPPLY, INC.		9345	PARTS & SUPPLIES	262.66	
19494	09/01/06	155.94	174	SAYLOR & HILL COMPANY		9374	111 DUBOIS	155.94	
19495	09/01/06	704.06	282	GRAINGER		9257	REPAIRS/MAINTENANCE	61.54	
						9258	REPAIRS/MAINTENANCE	642.52	
19496	09/01/06	60.19	288	MUNCIE TRANSIT SUPPLY		9346	REV VEH PARTS	60.19	
19497	09/01/06	565.36	294	ANDY'S AUTO SUPPLY		9347	REV VEH PARTS	565.36	
19498	09/01/06	276.24	372	FEDERAL EXPRESS		9259	JULY/AUG MAIL/ADM	276.24	
19499	09/01/06	3,150.00	432	EXPRESS PERSONNEL SERVICES		9260	CONTRACT PLACEMENT	3,150.00	
19500	09/01/06	126.65	434	VERIZON WIRELESS		9261	WIRELESS PC CARD	66.22	
						9262	WIRELESS PC CARD	60.43	
19501	09/01/06	53.72	434B	VERIZON CALIFORNIA		9348	MT. BIEWLASKI	53.72	
19502	09/01/06	289.21	436	WEST PAYMENT CENTER		9263	CIVIL PRO GUIDE	107.17	
						9264	CA CODE 2006	182.04	
19503	09/01/06	200.00	443	JOB FAIR		9265	JOB FAIR FEES	200.00	
19504	09/01/06	530.00	447	FERRIS HOIST & REPAIR, INC.		9349	OUT RPR EQUIP	530.00	
19505	09/01/06	750.00	475	TRAPEZE SOFTWARE GROUP, INC.		9266	7/1-12/31 MAINT FEES	750.00	
19506	09/01/06	1,130.00	478	BEE CLENE	0	9267	CARPET/OPS	385.00	
						9268	CARPET/ENCINAL	745.00	
19507	09/01/06	333,426.57	502	CA PUBLIC EMPLOYEES'		9269	SEPT MEDICAL INS	333,426.57	
19508	09/01/06	82.08	510	ASCOM HASLER LEASING					
	09/28/06	-82.08				9270	SEPT EQUIP RENTAL	0.00	VOIDED

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19509	09/01/06	97.42	510A	HASLER, INC.		9271	AUG EQUIP RENTAL	0.00	
19510	09/01/06	1,250.00	533	LINDSKOG, P.E., ROBERT	7	9294	AUG/SEPT EQUIP RNTL	97.42	
						9272	PROF SVC 6/8-6/13	625.00	
						9273	PROF SVC 8/3-8/4	625.00	
19511	09/01/06	1,000.00	616	BROWN ARMSTRONG		9274	AUDIT SERVICES	1,000.00	
19512	09/01/06	1,539.76	647	GFI GENFARE		9350	REV VEH PARTS	1,539.76	
19513	09/01/06	1,977.53	681	SCOTTS BODY SHOP	7	9275	OUT REPAIR-REV VEH	1,977.53	
19514	09/01/06	149.40	685	BROOKS INTERNET SOFTWARE, INC.		9276	PRINT SERV SW MAINT	149.40	
19515	09/01/06	342.00	711	GLASS DOCTOR	7	9351	OUT RPR OTH VEH	342.00	
19516	09/01/06	10,668.50	718	BOSTER, KOBAYASHI & ASSOC. INC	7	9277	7/17-7/19 PROF SVCS	10,668.50	
19517	09/01/06	1,078.70	733	CLAREMONT BEHAVIORAL SERVICES		9278	SEPT EAP PREMIUM	1,078.70	
19518	09/01/06	663.50	738	WESTERN RUBBER & SUPPLY INC.		9352	REV VEH PARTS	663.50	
19519	09/01/06	740.99	739	CENTURY CHEVROLET		9279	OUT REP REV VEH/PT	740.99	
19520	09/01/06	124.00	852	LAW OFFICES OF MARIE F. SANG	7	9280	WORKERS COMP CLAIMS	124.00	
19521	09/01/06	33.00	876	ATCHISON, BARISONE, CONDOTTI & KELLY SERVICES, INC.		9281	LEGAL SVCS/SAKATA	33.00	
19522	09/01/06	2,880.00	878			9282	TEMP/FIN W/E 7/30	960.00	
						9284	TEMP/FIN W/E 8/13	960.00	
						9285	TEMP/FIN W/E 8/6	960.00	
19523	09/01/06	3.25	880	SEISINT, INC.		9286	PROF/TECH SVC RISK	3.25	
19524	09/01/06	1,817.73	909	CLASSIC GRAPHICS		9353	OUT RPR REV VEH	1,817.73	
19525	09/01/06	875.00	916	DOCTORS ON DUTY		9287	6/24-7/26 DRUG TESTS	875.00	
19526	09/01/06	966.00	943	CLEAN BUILDING MAINTENANCE		9288	JULY JANITORIAL SVCS	966.00	
19527	09/01/06	297,950.44	948	ARNTZ BUILDERS, INC.		9289	CONST SVC MB TO 7/31	297,950.44	
19528	09/01/06	33,105.61	948A	WESTAMERICA BANK TRUST DEPT		9290	JULY RETAINAGE	33,105.61	
19529	09/01/06	195.84	959	FIRST ADVANTAGE CORPORATION		9291	1/31-4/29 DRUG TESTS	195.84	
19530	09/01/06	1,625.00	963	4 LESS TERMITE	7	9292	SUBTERRANEAN TRTMNT	1,625.00	
19531	09/01/06	8,722.87	977	SANTA CRUZ TRANSPORTATION, LLC					VOIDED
	09/28/06	-8,722.87				9293	JULY 06 PT SVCS	0.00	
19532	09/01/06	100.00	B003	BEAUTZ, JAN	7	9297	AUG BOARD MTG	100.00	
19533	09/01/06	50.00	B006	HINKLE, MICHELLE	7	9299	AUG BOARD MTG	50.00	
19534	09/01/06	100.00	B007	KEOGH, MICHAEL	7	9300	AUG BOARD MTG	100.00	
19535	09/01/06	50.00	B011	REILLY, EMILY	7	9302	AUG BOARD MTG	50.00	
19536	09/01/06	100.00	B012	SPENCE, PAT	7	9304	AUG BOARD MTG	100.00	
19537	09/01/06	100.00	B014	CITY OF WATSONVILLE		9306	AUG BOARD MTG	100.00	
19538	09/01/06	100.00	B015	ROTKIN, MIKE	7	9303	AUG BOARD MTG	100.00	
19539	09/01/06	50.00	B017	STONE, MARK	7	9305	AUG BOARD MTG	50.00	
19540	09/01/06	50.00	B018	BUSTICHI, DENE	7	9298	AUG BOARD MTG	50.00	
19541	09/01/06	100.00	B020	NICOL, KIRBY		9301	AUG BOARD MTG	100.00	
19542	09/01/06	44.00	E251	BARTHOLOMEW, JON		9354	DMV FEES	44.00	
19543	09/01/06	1,657.32	M003	WYANT, JUDI		9355	MED PAYMENT SUPP	1,657.32	
19544	09/01/06	1,691.22	M005	ROSS, EMERY		9372	MED PYMT SUPP	1,691.22	
19545	09/01/06	1,916.22	M007	BLAIR-ALWARD, GREGORY		9357	MED PAYMENT SUPP	1,916.22	
19546	09/01/06	1,916.22	M010	SHORT, SLOAN		9365	MED PYMT SUPP	1,916.22	
19547	09/01/06	1,423.56	M016	HICKLIN, DONALD KENT		9371	MED PYMT SUPP	1,423.56	
19548	09/01/06	492.66	M022	CAPELLA, KATHLEEN		9358	MED PYMT SUPP	492.66	
19549	09/01/06	1,775.94	M057	PARHAM, WALLACE		9361	MED PYMT SUPP	1,775.94	
19550	09/01/06	1,775.94	M058	POTEETE, BEVERLY		9364	MED PYMT SUPP	1,775.94	
19551	09/01/06	1,937.58	M061	KAMEDA, TERRY		9360	MED PYMT SUPP	1,937.58	
19552	09/01/06	1,573.80	M064	PETERS, TERRIE		9362	MED PYMT SUPP	1,573.80	
19553	09/01/06	217.02	M068	BASS, BETTY		9356	MED PAYMENT SUPP	217.02	

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19554	09/01/06	246.36	M069	JACOBS, KENNETH		9359	MED PYMT SUPP	246.36	
19555	09/01/06	246.36	M070	PICARELLA, FRANCIS		9363	MED PYMT SUPP	246.36	
19556	09/01/06	1,293.36	M072	BRIDINGER, CHRIS		9366	MED PYMT SUPP	1,293.36	
19557	09/01/06	1,775.94	M073	CENTER, DOUG					VOIDED
	09/14/06	-1,775.94				9367	MED PYMT SUPP	0.00	
19558	09/01/06	2,139.72	M074	GABRIELE, BERNARD					VOIDED
	09/14/06	-2,139.72				9368	MED PYMT SUPP	0.00	
19559	09/01/06	2,139.72	M075	HOWARD, CAROL					VOIDED
	09/14/06	-2,139.72				9369	MED PYMT SUPP	0.00	
19560	09/01/06	1,775.94	M076	VONWAL, YVETTE					VOIDED
	09/14/06	-1,775.94				9370	MED PYMT SUPP	0.00	
19561	09/01/06	3,923.95	R452	MUKHERJEE, SAMHITA		9295	TUITION & BOOKS	3,923.95	
19562	09/01/06	21.75	R453	GONZALEZ, BERENICE		9296	SETTLEMENT/RISK	21.75	
19563	09/01/06	148.04	002861	AMERICAN MESSAGING SVCS, LLC		9540	SEPT PAGER/FAC	116.24	MANUAL
						9541	SEPT PAGER/FLT	31.80	
19564	09/01/06	1,293.36	M073	SEPT PAGER FLT/FAC CENTER, DOUG		9542	MED PYMT SUPP	1,293.36	MANUAL
19565	09/01/06	1,293.36	M074	MED PYMT SUPP GABRIELE, BERNARD		9545	MED PYMT SUPP	1,293.36	MANUAL
19566	09/01/06	1,293.36	M075	MED PYMT SUPP HOWARD, CAROL		9543	MED PYMT SUPP	1,293.36	MANUAL
19567	09/01/06	1,293.36	M076	MED PYMT SUPP VONWAL, YVETTE		9544	MED PYMT SUPP	1,293.36	MANUAL
19568	09/15/06	101.92	001002	ORACLE CORPORATION		9451	SUPP/UPDATE 6/1-8/31	101.92	
19569	09/15/06	955.39	001020	EMED COMPANY		9452	SAFETY SUPPLIES 93	103.84	
						9453	NO SMOKING SIGN 823	851.55	
19570	09/15/06	8,128.30	001029	GOLDEN GATE SYSTEMS		9454	QTY 3 LASER PRINTERS	8,128.30	
19571	09/15/06	3,728.93	001036	STANDARD INSURANCE COMPANY		9455	SEPT LIFE/AD&D INS	3,728.93	
19572	09/15/06	125.00	001062	ALLTERRA ENVIRONMENTAL INC.		9456	JULY 06 PROF SVCS	125.00	
19573	09/15/06	7,071.56	001063	NEW FLYER INDUSTRIES LIMITED		9375	REV VEH PARTS 304	303.68	
						9376	REV VEH PARTS 928	927.59	
						9377	REV VEH PARTS 1338	1,338.08	
						9378	REV VEH PARTS 210	209.84	
						9379	REV VEH PARTS 629	629.25	
						9392	REV VEH PTS/SUP 3663	3,663.12	
19574	09/15/06	45,500.00	001080	OCTAGON RISK SERVICES, INC.		9457	MAR-FEB WC ADM FEE	45,500.00	
19575	09/15/06	343.00	001093	KROLL LABORATORY SPECIALISTS		9458	JUL/AUG DRUG TESTING	343.00	
19576	09/15/06	504.71	001112	BRINKS AWARDS & SIGNS	7	9380	PLATE/BADGE OPS	30.85	
						9381	NAME BARS OPS	473.86	
19577	09/15/06	1,445.49	001263	ABBOTT STREET RADIATOR, INC.		9382	OUT RPR REV VEH	417.71	
						9383	OUT RPR REV VEH	1,027.78	
19578	09/15/06	369.22	001315	WASTE MANAGEMENT		9459	AUG KINGS VILLAGE	154.56	
						9460	AUG MT HERMON/KINGS	44.10	
						9461	AUG RESEARCH PARK	170.56	
19579	09/15/06	71,332.32	001316	DEVCO OIL		9384	8/28-8/31 FUEL FLT	26,103.09	
						9385	9/1-9/10 FUEL FLT	45,229.23	
19580	09/15/06	38,429.58	001346	CITY OF SANTA CRUZ		9462	05/06 OFFICER/METRO	38,429.58	
19581	09/15/06	130.74	001753	FOX VALLEY SYSTEMS, INC		9463	REPAIRS/MAINT 100	130.74	
19582	09/15/06	3,845.78	001A	AT&T/MCI		9464	AUG PHONES/PT	54.41	

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						9465	AUG PHONES/ PT	497.39	
						9466	AUG PHONES/IT	1,470.45	
						9467	AUG PHONES	1,823.53	
19583	09/15/06	301.75	002063	COSTCO		9386	PHOTO PROC OPS	40.46	
						9387	PHOTO PROC-OPS	52.78	
						9468	OFFICE SUPPLIES/ADM	208.51	
19584	09/15/06	1,444.00	002123	GIRO, INC.		9469	HASTUS LIC/SVC AGRMT	1,444.00	
19585	09/15/06	2,500.00	002267	SHAW & YODER, INC.		9470	JULY LEGISLATIVE SVC	2,500.00	
19586	09/15/06	285.00	002295	FIRST ALARM		9471	MAY/JULY DISPATCH/PT	285.00	
19587	09/15/06	1,195.40	002459	SCOTTS VALLEY WATER DISTRICT		9472	6/6-8/7 KINGS VILLAG	1,195.40	
19588	09/15/06	1,030.12	002504	TIFCO INDUSTRIES		9388	PARTS & SUPPLIES	265.54	
						9389	PARTS & SUPPLIES	112.14	
						9390	PARTS & SUPPLIES	652.44	
19589	09/15/06	88,364.65	002569	COMERICA BANK		9473	WORK COMP FUND	88,364.65	
19590	09/15/06	4,608.62	002627	CDW GOVERNMENT, INC.		9474	10 LCD MNTRS/SUPP	4,608.62	
19591	09/15/06	971.31	002802	BATTERY SYSTEMS		9391	REV VEH PARTS	971.31	
19592	09/15/06	2,436.66	002805	TELEPATH CORPORATION		9393	SEPT MAINT/RPRS	2,436.66	
19593	09/15/06	2,163.20	002823	PAT PIRAS CONSULTING	7	9475	PROF SVCS THRU 8/31	2,163.20	
19594	09/15/06	5,092.04	002829	VALLEY POWER SYSTEMS, INC.		9394	REV VEH PARTS	73.66	
						9395	REV VEH PARTS	4,490.92	
						9396	REV VEH PARTS	527.46	
19595	09/15/06	850.00	002848	STATE OF CALIF. FISH & GAME					VOIDED
	09/28/06	-850.00				9539	CEQA SCH 2001042003	0.00	
19596	09/15/06	3,000.00	002862	ECOLOGICAL CONCERNS INC.		9476	REVEGETATION/CNST/MB	3,000.00	
19597	09/15/06	3,500.00	002863	OFFICESTAR		9477	EMPLOYEE TRAINING	3,500.00	
19598	09/15/06	705.04	002865	FLINT TRADING INC.		9478	REPAIRS/MAINTENANCE	705.04	
19599	09/15/06	797.95	002866	THE MERCURY NEWS					VOIDED
	09/28/06	-797.95				9479	SETTLEMENT/RISK	0.00	
19600	09/15/06	130.00	002868	GOTCHA SUBPOENA SERVICES		9480	AUG ADVERTISING	0.00	
19601	09/15/06	150.00	002869	CSA AMERICA		9481	SUBPOENA SVCS	130.00	
19602	09/15/06	22,593.58	009	PACIFIC GAS & ELECTRIC		9482	CNG TANK INSP. CERT.	150.00	
						9483	8/5-9/1 920 PACIFIC	1,937.68	
						9484	8/1-8/29 111 VERNON	15.15	
						9485	7/28-8/29 111 DUB	5,702.83	
						9486	8/2-8/29 370 ENCINAL	3,350.56	
						9487	8/1-8/29 1200 RIVER	1,781.96	
						9537	CNG GAS/7TH AVE	10.38	
						9538	AUG CNG-FLT	9,795.02	
19603	09/15/06	1,028.75	018	SALINAS VALLEY FORD SALES		9397	REV VEH PARTS	487.50	
						9398	REV VEH PARTS	541.25	
19604	09/15/06	618.52	039	KINKO'S INC.		9399	PRINTING-OPS	333.52	
						9400	FALL BID-OPS	285.00	
19605	09/15/06	78.67	040	LENZ ARTS, INC.		9488	EMP INCENTIVE-FRAME	78.67	
19606	09/15/06	744.69	041	MISSION UNIFORM		9489	AUG UNIF/LAUNDRY/FAC	572.70	
						9490	AUG UNIF/LAUNDRY/PT	171.99	
19607	09/15/06	1.58	042	ORCHARD SUPPLY HARDWARE		9491	REPAIRS/MAINTENANCE	1.58	
19608	09/15/06	638.11	043	PALACE ART & OFFICE SUPPLY		9492	OFFICE SUPPLIES	638.11	
19609	09/15/06	172.13	050	PITNEY BOWES INC.		9493	OFFICE SUPPLIES	172.13	
19610	09/15/06	8.12	074	KENVILLE LOCKSMITHS	7	9401	REV VEH PARTS	8.12	
19611	09/15/06	6,668.12	079	SANTA CRUZ MUNICIPAL UTILITIES		9494	7/26-8/23 ENCINAL	774.46	

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						9495	7/26-8/23 111 DUBOIS	378.47	
						9496	7/26-8/23 ENCINAL	109.93	
						9497	7/26-8/23 1200 RIVER	2,113.00	
						9498	7/26-8/23 GOLF CLUB	875.20	
						9499	7/28-8/25 PACIFIC	110.44	
						9500	7/28-8/25 PACIFIC	2,306.62	
19612	09/15/06	1,500.14	105	SHIELDS, HARPER & CO., INC.		9402	PARTS & SUPPLIES	1,500.14	
19613	09/15/06	279.55	107	SAN LORENZO LUMBER		9403	OTHER MOBILE SUPP	36.43	
						9501	REPAIRS/MAINT/FAC	243.12	
19614	09/15/06	187.50	126	EUCALYPTUS LANDSCAPING, LLC		9502	LOT SWEEPING/ SV	187.50	
19615	09/15/06	21.96	147	ZEE MEDICAL SERVICE CO.		9503	SAFETY SUPPLIES	21.96	
19616	09/15/06	533.20	148	ZEP MANUFACTURING COMPANY		9404	SAFETY SUPPLIES	533.20	
19617	09/15/06	5,688.22	156	PRINT GALLERY, THE		9504	PRINT ROUTE STICKERS	4,088.66	
						9505	PRINT ROUTE STICKERS	1,599.56	
19618	09/15/06	1,000.00	162	WASHINGTON LETTER ON TRANSPORT		9506	ANNUAL RENEWAL	1,000.00	
19619	09/15/06	185.94	172	CENTRAL WELDER'S SUPPLY, INC.		9405	PTS/SAFETY SUPPLIES	185.94	
19620	09/15/06	570.71	215	IKON OFFICE SOLUTIONS		9406	MAINT 5/28-8/28 OPS	570.71	
19621	09/15/06	313.56	382	AIRTEC SERVICE		9507	OUT RPR BLDGS/GRNDS	313.56	
19622	09/15/06	667.58	395	APPLIED GRAPHICS, INC.		9407	PRINTING-OPS	667.58	
19623	09/15/06	1,705.00	447	FERRIS HOIST & REPAIR, INC.		9408	OUT RPR EQUIP	1,705.00	
19624	09/15/06	375.00	478	BEE CLENE	0	9508	CARPET/PACIFIC	375.00	
19625	09/15/06	849.76	480	DIESEL MARINE ELECTRIC, INC.		9409	REV VEH PARTS	849.76	
19626	09/15/06	333.00	481	PIED PIPER EXTERMINATORS, INC.		9509	SEPT PEST CONTROL	333.00	
19627	09/15/06	1,650.00	502	CA PUBLIC EMPLOYEES'		9510	SEPT MEDICAL INS	1,650.00	
19628	09/15/06	89.75	510A	HASLER, INC.		9511	10/1-10/31 RENTL/ADM	48.71	
						9512	10/1-10/31 RENTAL/PT	41.04	
19629	09/15/06	1,820.00	681	SCOTTS BODY SHOP	7	9410	OUT RPR OTH VEH	1,820.00	
19630	09/15/06	70.00	682	WEISS, AMY L.	7	9513	AUG INTERPRETER	70.00	
19631	09/15/06	455.20	711	GLASS DOCTOR	7	9411	OUT RPR OTH VEH	455.20	
19632	09/15/06	877.47	739	CENTURY CHEVROLET		9514	OUT REP REV VEH/PT	877.47	
19633	09/15/06	36,872.35	800	DELTA DENTAL PLAN		9515	SEPT DENTAL	36,872.35	
19634	09/15/06	8,062.06	851	I.M.P.A.C. GOVERNMENT SERVICES		9516	4055019201230822	8,062.06	
19635	09/15/06	1,813.50	852	LAW OFFICES OF MARIE F. SANG	7	9517	WORKERS COMP CLAIMS	1,813.50	
19636	09/15/06	329.00	861	EMPLOYER RESOURCE INSTITUTE		9412	SUBSCRIPTION/FLT	329.00	
19637	09/15/06	1,896.00	878	KELLY SERVICES, INC.		9518	TEMP/FIN W/E 8/27	960.00	
						9519	TEMP/FIN W/E 8/20	936.00	
19638	09/15/06	173.20	882	PRINT SHOP SANTA CRUZ		9414	BUSINESS CARDS-OPS	173.20	
19639	09/15/06	234.00	884	UNITED STATES POSTAL SERVICE		9415	POSTAGE-OPS	234.00	
19640	09/15/06	26,607.41	904	RNL DESIGN		9521	PROF SVCS THRU 7/30	26,607.41	
19641	09/15/06	3,014.78	909	CLASSIC GRAPHICS		9413	OUT RPR REV VEH	1,818.53	
						9520	OUT REPAIR/BUILDINGS	1,196.25	
19642	09/15/06	662.77	932	A.L. LEASE COMPANY, INC.		9522	REPAIRS/MAINTENANCE	662.77	
19643	09/15/06	942.84	934	ADVANCED NETWORK SYSTEMS		9523	MCAFFEE LICENSE/MAINT	942.84	
19644	09/15/06	15,124.33	941	ASSURANT EMPLOYEE BENEFITS		9524	SEPT LTD INSURANCE	15,124.33	
19645	09/15/06	10.83	946	ACME AND SONS		9416	FENCE RENT/DUBOIS	10.83	
19646	09/15/06	35.00	955	LEAGUE OF CALIFORNIA CITIES		9525	ETHICS / AGUIRRE	35.00	
19647	09/15/06	35.00	955A	LEAGUE OF CALIFORNIA CITIES		9526	ETHICS/BRONDSTATTER	35.00	
19648	09/15/06	35.00	955B	LEAGUE OF CALIFORNIA CITIES		9527	ETHICS / CHENG	35.00	
19649	09/15/06	35.00	955C	LEAGUE OF CALIFORNIA CITIES		9528	ETHICS / DORFMAN	35.00	
19650	09/15/06	35.00	955D	LEAGUE OF CALIFORNIA CITIES		9529	ETHICS / FERRICK	35.00	

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19651	09/15/06	35.00	955E	LEAGUE OF CALIFORNIA CITIES		9530	ETHICS / GALE	35.00	
19652	09/15/06	35.00	955F	LEAGUE OF CALIFORNIA CITIES		9531	ETHICS / GLATT	35.00	
19653	09/15/06	35.00	955G	LEAGUE OF CALIFORNIA CITIES		9532	ETHICS / PAULSON	35.00	
19654	09/15/06	35.00	955H	LEAGUE OF CALIFORNIA CITIES		9533	ETHICS / SLATER	35.00	
19655	09/15/06	35.00	955I	LEAGUE OF CALIFORNIA CITIES		9534	ETHICS / WHITE	35.00	
19656	09/15/06	50.00	B016	SKILLICORN, DALE	7	9536	SEPT BOARD MTG	50.00	
19657	09/15/06	18.00	E397	GALLAGHER, MARGARET		9535	PARKING/NBI CONF.	18.00	
19658	09/15/06	255.48	M030	ROWE, RUBY		9417	MED PYMT SUPP	255.48	
19659	09/15/06	255.48	M033	BAILEY, NEIL		9418	MED PYMT SUPP	255.48	
19660	09/15/06	127.74	M036	CERVANTES, GLORIA					VOIDED
	09/28/06	-127.74				9422	MED PYMT SUPP	0.00	
19661	09/15/06	127.74	M039	DAVILA, ANA MARIA		9423	MED PYMT SUPP	127.74	
19662	09/15/06	127.74	M040	GARBEZ, LINDA		9424	MED PYMT SUPP	127.74	
19663	09/15/06	255.48	M041	GOUVEIA, ROBERT		9425	MED PYMT SUPP	255.48	
19664	09/15/06	255.48	M042	HOBBS, JAMES		9428	MED PYMT SUPP	255.48	
19665	09/15/06	568.26	M043	HOLODNICK, JAMES		9429	MED PYMT SUPP	568.26	
19666	09/15/06	127.74	M050	O'MARA, KATHLEEN		9430	MED PYMT SUPP	127.74	
19667	09/15/06	437.16	M051	PENDRAGON, LINDA		9431	MED PYMT SUPP	437.16	
19668	09/15/06	255.48	M054	SLOAN, FRANCIS		9433	MED PYMT SUPP	255.48	
19669	09/15/06	568.26	M077	BRADFORD, THOMAS		9419	MED PYMT SUPP	568.26	
19670	09/15/06	437.16	M078	BRIDINGER, DENISE		9420	MED PYMT SUPP	437.16	
19671	09/15/06	218.58	M080	CARR, DALE		9421	MED PYMT SUPP	218.58	
19672	09/15/06	332.40	M081	HALL, JAMES		9426	MED PYMT SUPP	332.40	
19673	09/15/06	127.74	M082	HINDIN, LENORE		9427	MED PYMT SUPP	127.74	
19674	09/15/06	255.48	M085	ROSSI, DENISE		9432	MED PYMT SUPP	255.48	
19675	09/15/06	127.74	M086	TOLINE, DONALD		9434	MED PYMT SUPP	127.74	
19676	09/15/06	127.74	M088	YAGI, RANDY		9435	MED PYMT SUPP	127.74	
19677	09/15/06	120.90	M090	CLARKE, PATRICIA		9436	MED PYMT SUPP	120.90	
19678	09/15/06	246.36	M092	CRAWFORD, TERRI		9437	MED PYMT SUPP	246.36	
19679	09/15/06	246.36	M095	DIXON, GEORGE		9438	MED PYMT SUPP	246.36	
19680	09/15/06	246.36	M096	DRAKE, JUDITH		9439	MED PYMT SUPP	246.36	
19681	09/15/06	246.36	M098	FAUCI, SUSAN		9440	MED PYMT SUPP	246.36	
19682	09/15/06	246.36	M099	FIKE, LOUIS		9441	MED PYMT SUPP	246.36	
19683	09/15/06	246.36	M101	GOES, ALAN		9442	MED PYMT SUPP	246.36	
19684	09/15/06	120.90	M103	JEMISON, MAURICE		9443	MED PYMT SUPP	120.90	
19685	09/15/06	246.36	M104	JUSSEL, PETE		9444	MED PYMT SUPP	246.36	
19686	09/15/06	120.90	M105	KOHAMA, MARY		9445	MED PYMT SUPP	120.90	
19687	09/15/06	120.90	M106	LYALL, JOHN		9446	MED PYMT SUPP	120.90	
19688	09/15/06	246.36	M108	MILLER, FOREST		9447	MED PYMT SUPP	246.36	
19689	09/15/06	120.90	M111	SANCHEZ, FELIX		9448	MED PYMT SUPP	120.90	
19690	09/15/06	246.36	M112	SILVA, EDUARDO		9449	MED PYMT SUPP	246.36	
19691	09/15/06	246.36	M115	WILLIAMS, CHRIS		9450	MED PYMT SUPP	246.36	
19692M	09/15/06	127.74	M036	CERVANTES, GLORIA		9706	MED PYMT SUPPLEMENT	127.74	MANUAL
				MED PYMT SUPP					
19693M	09/15/06	850.00	002848	STATE OF CALIF. FISH & GAME		9705	CEQA SCH 2001042003	850.00	MANUAL
				CEQA SCH 2001042003					
19695M	09/22/06	680.00	080	STATE BOARD OF EQUALIZATION		9700	AUG USE TAX PREPAY	680.00	MANUAL
				AUG USE TAX PREPAY					
19696M	09/15/06	220.50	002866	THE MERCURY NEWS		9704	AUG ADVERTISING	220.50	MANUAL
				AUGUST ADVERTISING					

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19697M	09/15/06	577.45	R459	THE MERCURY NEWS		9703	SETTLEMENT/RISK	577.45	MANUAL
19698	09/29/06	498.55	001	SBC		9604	SEPT PHONES/OPS	86.34	
19699	09/29/06	10,000.00	001026	DRIVER ALLIANT INSURANCE		9605	SEPT REPEATERS/OPS	412.21	
19700	09/29/06	43,839.01	001035	HARRIS & ASSOCIATES		9606	EXCESS WC BR FEE	10,000.00	
19701	09/29/06	1,788.97	001048	CRUZ CAR WASH		9607	MB JULY 06 PROF SVCS	43,839.01	
19702	09/29/06	12,901.63	001063	NEW FLYER INDUSTRIES LIMITED		9608	REV VEH WASH/PT	1,788.97	
						9546	REV VEH PARTS 28	44.70	
						9547	REV VEH PARTS 933	932.76	
						9548	REV VEH PARTS 1567	1,567.15	
						9549	REV VEH PARTS 1783	1,782.66	
						9550	SMALL TOOL 203	202.46	
						9551	REV VEH PARTS 717	716.94	
						9552	REV VEH PARTS 558	558.45	
						9553	REV VEH PARTS 5	4.69	
						9554	REV VEH PARTS 5	4.80	
						9555	REV VEH PARTS 6421	6,421.02	
						9556	REV VEH PARTS 666	666.00	
19703	09/29/06	12,136.08	001075	SOQUEL III ASSOCIATES	7	9609	SECURITY DEP. 10/06	335.86	
						9000568	RESEARCH PARK RENT	11,800.22	
19704	09/29/06	7,590.00	001076	BROUGHTON LAND, LLC		9000569	110 VERNON ST RENT	7,590.00	
19705	09/29/06	1,407.05	001119	MACERICH PARTNERSHIP LP	7	9000570	CAPITOLA MALL RENT	1,407.05	
19706	09/29/06	2,894.89	001230	CAPITOL CLUTCH & BRAKE, INC.		9557	REV VEH PARTS	2,319.11	
						9558	REV VEH PARTS	575.78	
19707	09/29/06	70,060.25	001316	DEVCO OIL		9559	FUEL FLT 9/15-9/24	70,060.25	
19708	09/29/06	611.25	001346	CITY OF SANTA CRUZ		9610	6/03-7/06 MB INSPECT	611.25	
19709	09/29/06	3,153.36	001365	BORTNICK, ROBERT S. & ASSOC.	7	9611	PROF/TECH 8/25-9/21	3,153.36	
19710	09/29/06	158.84	001454	MONTEREY BAY OFFICE PRODUCTS		9612	9/1-11/30 COPIER/ADM	158.84	
19711	09/29/06	3,765.66	001492	EVERGREEN OIL INC.		9613	HAZ WASTE DISPOSAL	3,765.66	
19712	09/29/06	8,801.26	001800	THERMO KING OF SALINAS, INC		9560	REV VEH PARTS	8,801.26	
19713	09/29/06	164.04	002028	WESTCOAST LEGAL SERVICE	7	9614	PROF/TECH SVCS	164.04	
19714	09/29/06	581.00	002035	BOWMAN & WILLIAMS		9615	TOPO OF BUS TRNARND	581.00	
19715	09/29/06	157.31	002063	COSTCO		9561	PHOTO PROC OPS	63.34	
						9562	PHOTO PROC OPS	20.91	
						9563	PHOTO PROC OPS	30.92	
						9616	PHOTO PROC. LGL/RISK	8.33	
						9617	OFFICE SUPPLIES/ FIN	10.13	
						9618	LOCAL MEETING EXP	23.68	
19716	09/29/06	26,500.00	002116	HINSHAW, EDWARD & BARBARA	7	9000571	370 ENCINAL RENT	26,500.00	
19717	09/29/06	14,214.64	002117	IULIANO	7	9000572	111 DUBOIS RENT	11,214.64	
						9000573	115 DUBOIS RENT	3,000.00	
19718	09/29/06	1,444.37	002189	BUS & EQUIPMENT		9619	REV VEH PARTS/PT	1,444.37	
19719	09/29/06	28,449.30	002295	FIRST ALARM		9564	AUG SECURITY	28,449.30	
19720	09/29/06	5,000.00	002346	CHANEY, CAROLYN & ASSOC., INC.		9620	SEPT LEGISLATIVE SVC	5,000.00	
19721	09/29/06	51.62	002406	KHS INDUSTRIAL TOOLS & SUPPLIE		9565	SMALL TOOLS	51.62	
19722	09/29/06	177.00	002495	CURIALE DELLAVERSON HIRSCHFELD 7		9621	8/22-8/31 LEGAL SVCS	177.00	
19723	09/29/06	162.82	002504	TIFCO INDUSTRIES		9566	PARTS & SUPPLIES	44.92	
						9567	PARTS & SUPPLIES	117.90	
19724	09/29/06	32.00	002567	DEPARTMENT OF JUSTICE		9622	AUG FINGERPRINTS	32.00	
19725	09/29/06	1,921.53	002607	STAVELEY SERVICES FLUIDS		9568	OUT RPR REV VEH 225	1,921.53	

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19726	09/29/06	1,373.34	002713	SANTA CRUZ AUTO TECH, INC.		9623	OUT RPR REV VEH/PT	1,373.34	
19727	09/29/06	1,057.79	002721	NEXTEL COMMUNICATIONS		9624	8/4-9/3 PHONES/PT	1,057.79	
19728	09/29/06	295.00	002805	TELEPATH CORPORATION		9569	OUT RPR EQUIP	295.00	
19729	09/29/06	123.12	002814	CREATIVE BUS SALES, INC.		9625	REV VEH PARTS/PT	123.12	
19730	09/29/06	8,987.28	002817	WATSONVILLE BLUEPRINT		9626	MB PLANS FOR ADMIN	8,987.28	
19731	09/29/06	6,368.65	002829	VALLEY POWER SYSTEMS, INC.		9570	REV VEH PARTS	210.74	
						9571	SMALL TOOL	44.03	
						9572	OUT RPR REV VEH	6,113.88	
19732	09/29/06	627.00	002847	STATE OF CA-EDD		9627	PARADISE LEVY	627.00	
19733	09/29/06	65.00	002868	GOTCHA SUBPOENA SERVICES		9628	PROF/TECH/RISK	65.00	
19734	09/29/06	2,000.00	002873	USPS-HASLER		9629	POSTAGE/ADM	2,000.00	
19735	09/29/06	583.82	004	NORTH BAY FORD LINC-MERCURY		9573	REV VEH PTS/SUPPLIES	583.82	
19736	09/29/06	143.45	007	UNITED PARCEL SERVICE		9574	AUG/SEPT FRT OUT	143.45	
19737	09/29/06	3,208.11	009	PACIFIC GAS & ELECTRIC		9630	8/15-9/14 RESEARCH	1,102.13	
						9631	7/15-9/9 KINGS VILL.	2,105.98	
19738	09/29/06	6,055.51	018	SALINAS VALLEY FORD SALES		9575	REV VEH PARTS	1,922.41	
						9576	REV VEH PARTS	4,133.10	
19739	09/29/06	311.01	020	ADT SECURITY SERVICES INC.		9632	OCT ALARMS	311.01	
19740	09/29/06	43.54	036	KELLY-MOORE PAINT CO., INC.		9633	REPAIRS/MAINTENANCE	43.54	
19741	09/29/06	315.58	039	KINKO'S INC.		9577	PRINTING OPS	129.90	
						9578	PRINTING OPS	103.92	
						9634	AUG PRINTING	81.76	
19742	09/29/06	2,021.16	041	MISSION UNIFORM		9579	AUG UNIF/LAUNDRY FLT	2,021.16	
19743	09/29/06	163.98	061	REGISTER PAJARONIAN		9635	PUB NOTICE ADM 9/8	163.98	
19744	09/29/06	245.97	061A	REGISTER PAJARONIAN		9580	CLASS ADV FLT	245.97	
19745	09/29/06	509.00	067	ROTO-ROOTER		9636	OUT RPR-BLD/GRNDS	358.00	
						9637	OUT RPR-BLD/GRNDS	151.00	
19746	09/29/06	24.74	074	KENVILLE LOCKSMITHS	7	9581	PARTS & SUPPLIES	24.74	
19747	09/29/06	31.60	079	SANTA CRUZ MUNICIPAL UTILITIES		9638	8/1-8/31 LANDFILL	31.60	
19748	09/29/06	2,340.00	080C	STATE BOARD OF EQUALIZATION		9582	FUEL TAX- 06/07	2,340.00	
19749	09/29/06	21,010.24	085	DIXON & SON TIRE, INC.		9583	AUG TIRES/TUBES FLT	21,010.24	
19750	09/29/06	2,519.58	110	JESSICA GROCERY STORE, INC.		9000574	CUSTODIAL SERVICES	2,519.58	
19751	09/29/06	79.00	115	SNAP-ON INDUSTRIAL		9584	OUT RPR EQUIP	79.00	
19752	09/29/06	2,363.21	117	GILLIG CORPORATION		9585	OTH MOBILE SUPPLIES	2,363.21	
19753	09/29/06	101.67	130	CITY OF WATSONVILLE UTILITIES		9639	8/1-9/1 25 SAKATA LN	77.49	
						9640	8/4-9/1 RODRIGUEZ	10.01	
						9641	8/4-9/1 25 SAKATA LN	14.17	
19754	09/29/06	2,743.83	135	SANTA CRUZ AUTO PARTS, INC.		9586	REV VEH PTS/SFTY SUP	1,801.96	
						9642	REV VEH PARTS/SUPPLY	941.87	
19755	09/29/06	68.20	147	ZEE MEDICAL SERVICE CO.		9643	SAFETY SUPPLIES	68.20	
19756	09/29/06	557.93	148	ZEP MANUFACTURING COMPANY		9644	CLEANING SUPPLY /FAC	557.93	
19757	09/29/06	745.85	149	SANTA CRUZ SENTINEL		9587	AUG ADV FLT	538.66	
						9645	10/06-10/07 SUBSCRIP	207.19	
19758	09/29/06	833.53	156	PRINT GALLERY, THE		9646	PRINT ROUTE STICKERS	833.53	
19759	09/29/06	1,430.38	161	OCEAN CHEVROLET		9588	REV VEH PRTS FLT	571.43	
						9647	REV VEH PARTS/PT	858.95	
19760	09/29/06	2,429.98	166	HOSE SHOP, THE		9589	REV VEH PTS/SUPP	1,249.12	
						9590	REV VEH PTS/SUPP	1,073.93	
						9648	REPAIRS/MAINTENANCE	106.93	
19761	09/29/06	776.91	170	TOWNSEND'S AUTO PARTS		9591	SAFETY/PTS/SUPP	776.91	

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
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 ALL CHECKS FOR COAST COMMERCIAL BANK

DATE: 09/01/06 THRU 09/30/06

CHECK NUMBER	CHECK DATE	CHECK AMOUNT	VENDOR	VENDOR NAME	VENDOR TRANS. TYPE	TRANS. NUMBER	TRANSACTION DESCRIPTION	TRANSACTION AMOUNT	COMMENT
19762	09/29/06	711.00	174	SAYLOR & HILL COMPANY		9649	ANNUAL PREMIUM	711.00	
19763	09/29/06	943.70	221	VEHICLE MAINTENANCE PROGRAM		9592	REV VEH PARTS 944	943.70	
19764	09/29/06	560.92	294	ANDY'S AUTO SUPPLY		9593	REV VEH PTS/SUPPLIES	560.92	
19765	09/29/06	184.00	367	COMMUNITY TELEVISION OF		9650	TV COVERAGE 8/25 MTG	184.00	
19766	09/29/06	426.60	372	FEDERAL EXPRESS		9594	AUG MAIL FLT	88.46	
						9651	SEPT MAIL/HRD	67.07	
						9652	AUG PRINTING/LGL	4.82	
						9653	AUG/SEPT MAIL/ADM	266.25	
19767	09/29/06	231.40	413	COLUMBIA EQUIPMENT COMPANY INC		9654	REPAIRS/MAINT. 206	231.40	
19768	09/29/06	1,787.57	422	IMAGE SALES INC.		9655	PHOTO SUPPLIES/METRO	1,611.69	
						9656	PHOTO SUPPLIES/HRD	175.88	
19769	09/29/06	72.01	434	VERIZON WIRELESS		9657	WIRELESS PC CARD	72.01	
19770	09/29/06	51.60	434B	VERIZON CALIFORNIA		9699	MT.BIEWLASKI	51.60	
19771	09/29/06	91.54	436	WEST PAYMENT CENTER		9658	AUG ACCESS CHGS	91.54	
19772	09/29/06	363.72	448	UNISOURCE		9595	OFFICE SUPPLIES	363.72	
19773	09/29/06	12,427.32	475	TRAPEZE SOFTWARE GROUP, INC.		9659	11/06-10/07 MNT FEES	12,427.32	
19774	09/29/06	1,445.14	480	DIESEL MARINE ELECTRIC, INC.		9596	REV VEH PARTS	1,445.14	
19775	09/29/06	224.34	493	IMAGING PRODUCTS INTERNATIONAL		9597	PHOTO SUPPLY OPS	224.34	
19776	09/29/06	329,557.96	502	CA PUBLIC EMPLOYEES'		9660	OCT MEDICAL INS	329,557.96	
19777	09/29/06	82.08	510A	HASLER, INC.		9702	SEPT EQUIP RENTAL	41.04	
						9707	AUG EQUIP RENTAL	41.04	
19778	09/29/06	369.34	647	GFI GENFARE		9598	REV VEH PARTS	369.34	
19779	09/29/06	8,368.09	664	BAY COUNTIES PITCOCK PETROLEUM		9698	FUEL/LUBE FLT	8,368.09	
19780	09/29/06	561.00	674	LIEBERT CASSIDY WHITMORE	7	9661	9/1-12/31 EMP TRAIN	561.00	
19781	09/29/06	441.06	711	GLASS DOCTOR	7	9662	OUT RPR REV VEH	441.06	
19782	09/29/06	197.00	723	COUNCIL ON EDUCATION IN		9663	SUBSCRIPTION RENEWAL	197.00	
19783	09/29/06	597.60	731	KENT-MOORE TOOL GROUP		9599	REPAIR KIT	597.60	
19784	09/29/06	3,458.60	733	CLAREMONT BEHAVIORAL SERVICES		9664	PT TRAINING	2,400.00	
						9665	OCT EAP PREMIUM	1,058.60	
19785	09/29/06	2,025.00	764	MERCURY METALS		9666	REPAIRS/MAINTENANCE	2,025.00	
19786	09/29/06	364.61	788	SCMTD PETTY CASH - FINANCE		9667	PETTY CASH/FINANCE	364.61	
19787	09/29/06	1,218.40	852	LAW OFFICES OF MARIE F. SANG	7	9668	WORKERS COMP CLAIMS	1,218.40	
19788	09/29/06	11,200.00	853	ZELLER APPRAISAL SERVICES, INC		9669	VERNON/RIVER APPRAIS	11,200.00	
19789	09/29/06	2,688.00	878	KELLY SERVICES, INC.		9670	TEMP/FIN W/E 9/3	960.00	
						9671	TEMP/FIN W/E 9/10	768.00	
						9672	TEMP/ADM W/E 9/17	960.00	
19790	09/29/06	3.70	880	SEISINT, INC.		9673	PROF/TECH SVC/RISK	3.70	
19791	09/29/06	71.00	886	ALL PURE WATER		9600	OFFICE SUPPLIES	71.00	
19792	09/29/06	4,799.51	909	CLASSIC GRAPHICS		9601	OUT RPR REV VEH	3,410.99	
						9602	OUT RPR REV VEH	1,388.52	
19793	09/29/06	36.29	932	A.L. LEASE COMPANY, INC.		9674	REPAIRS/MAINTENANCE	36.29	
19794	09/29/06	897.00	943	CLEAN BUILDING MAINTENANCE		9675	AUG JANITORIAL SVCS	897.00	
19795	09/29/06	394,498.80	948	ARNTZ BUILDERS, INC.		9676	CONST SVC MB TO 8/31	394,498.80	
19796	09/29/06	43,833.20	948A	WESTAMERICA BANK TRUST DEPT		9677	AUG RETAINAGE	43,833.20	
19797	09/29/06	990.00	957	SECURITY SHORING & STEEL PLT		9678	STEEL PLATE RENTAL	990.00	
19798	09/29/06	16,940.54	977	SANTA CRUZ TRANSPORTATION, LLC		9679	AUG 06 PT SVC	8,217.67	
						9701	JULY 06 PT SVCS	8,722.87	
19799	09/29/06	225.00	989	STUCKER, NANCY K.	7	9680	PROF SVCS/BILINGUAL	225.00	
19800	09/29/06	100.00	B003	BEAUTZ, JAN	7	9688	SEPT BOARD MTG	100.00	
19801	09/29/06	50.00	B006	HINKLE, MICHELLE	7	9690	SEPT BOARD MTG	50.00	

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
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19802	09/29/06	100.00	B007	KEOGH, MICHAEL	7	9691	SEPT BOARD MTG	100.00
19803	09/29/06	100.00	B011	REILLY, EMILY	7	9693	SEPT BOARD MTG	100.00
19804	09/29/06	100.00	B012	SPENCE, PAT	7	9695	SEPT BOARD MTG	100.00
19805	09/29/06	100.00	B014	CITY OF WATSONVILLE		9697	SEPT BOARD MTG	100.00
19806	09/29/06	100.00	B015	ROTKIN, MIKE	7	9694	SEPT BOARD MTG	100.00
19807	09/29/06	50.00	B017	STONE, MARK	7	9696	SEPT BOARD MTG	50.00
19808	09/29/06	50.00	B018	BUSTICHI, DENE	7	9689	SEPT BOARD MTG	50.00
19809	09/29/06	50.00	B020	NICOL, KIRBY		9692	SEPT BOARD MTG	50.00
19810	09/29/06	939.74	E192	SOUZA, JUDY		9681	8/23/06 ARBITRATION	939.74
19811	09/29/06	44.00	E250	COWELL, RICHARD		9603	DMV FEES	44.00
19812	09/29/06	276.22	M003	WYANT, JUDI		9000575	MED PYMT SUPP	276.22
19813	09/29/06	281.87	M005	ROSS, EMERY		9000576	MED PYMT SUPP	281.87
19814	09/29/06	319.37	M007	BLAIR-ALWARD, GREGORY		9000577	MED PYMT SUPP	319.37
19815	09/29/06	319.37	M010	SHORT, SLOAN		9000578	MED PYMT SUPP	319.37
19816	09/29/06	237.26	M016	HICKLIN, DONALD KENT		9000579	MED PYMT SUPP	237.26
19817	09/29/06	82.11	M022	CAPELLA, KATHLEEN		9000580	MED PYMT SUPP	82.11
19818	09/29/06	42.58	M030	ROWE, RUBY		9000581	MED PYMT SUPP	42.58
19819	09/29/06	42.58	M033	BAILEY, NEIL		9000582	MED PYMT SUPP	42.58
19820	09/29/06	21.29	M036	CERVANTES, GLORIA		9000583	MED PYMT SUPP	21.29
19821	09/29/06	276.23	M039	DAVILA, ANA MARIA		9687	COBRA OVERPAYMENTS	254.94
						9000584	MED PYMT SUPP	21.29
19822	09/29/06	21.29	M040	GARBEZ, LINDA		9000585	MED PYMT SUPP	21.29
19823	09/29/06	42.58	M041	GOUVEIA, LORBERT		9000586	MED PYMT SUPP	42.58
19824	09/29/06	42.58	M042	HOBBS, JAMES		9000587	MED PYMT SUPP	42.58
19825	09/29/06	94.71	M043	HOLODNICK, JAMES		9000588	MED PYMT SUPP	94.71
19826	09/29/06	21.29	M050	O'MARA, KATHLEEN		9000589	MED PYMT SUPP	21.29
19827	09/29/06	72.86	M051	PENDRAGON, LINDA		9000590	MED PYMT SUPP	72.86
19828	09/29/06	42.58	M054	SLOAN, FRANCIS		9000591	MED PYMT SUPP	42.58
19829	09/29/06	295.99	M057	PARHAM, WALLACE		9000592	MED PYMT SUPP	295.99
19830	09/29/06	295.99	M058	POTEETE, BEVERLY		9000593	MED PYMT SUPP	295.99
19831	09/29/06	322.93	M061	KAMEDA, TERRY		9000594	MED PYMT SUPP	322.93
19832	09/29/06	262.30	M064	PETERS, TERRIE		9000595	MED PYMT SUPP	262.30
19833	09/29/06	36.17	M068	BASS, BETTY		9000596	MED PYMT SUPP	36.17
19834	09/29/06	41.06	M069	JACOBS, KENNETH		9000597	MED PYMT SUPP	41.06
19835	09/29/06	41.06	M070	PICARELLA, FRANCIS		9000598	MED PYMT SUPP	41.06
19836	09/29/06	215.56	M072	BRIDINGER, CHRIS		9000599	MED PYMT SUPP	215.56
19837	09/29/06	215.56	M073	CENTER, DOUG		9000600	ME PYMT SUPP	215.56
19838	09/29/06	215.56	M074	GABRIELE, BERNARD		9000601	MED PYMT SUPP	215.56
19839	09/29/06	215.56	M075	HOWARD, CAROL		9000602	MED PYMT SUPP	215.56
19840	09/29/06	215.56	M076	VONWAL, YVETTE		9000603	MED PYMT SUPP	215.56
19841	09/29/06	94.71	M077	BRADFORD, THOMAS		9000604	MED PYMT SUPP	94.71
19842	09/29/06	72.86	M078	BRIDINGER, DENISE		9000605	MED PYMT SUPP	72.86
19843	09/29/06	36.43	M080	CARR, DALE		9000606	MED PYMT SUPP	36.43
19844	09/29/06	55.40	M081	HALL, JAMES		9000607	MED PYMT SUPP	55.40
19845	09/29/06	21.29	M082	HINDIN, LENORE		9000608	MED PYMT SUPP	21.29
19846	09/29/06	42.58	M085	ROSSI, DENISE		9000609	MED PYMT SUPP	42.58
19847	09/29/06	21.29	M086	TOLINE, DONALD		9000610	MED PYMT SUPP	21.29
19848	09/29/06	21.29	M088	YAGI, RANDY		9000611	MED PYMT SUPP	21.29
19849	09/29/06	20.15	M090	CLARKE, PATRICIA		9000612	MED PYMT SUPP	20.15
19850	09/29/06	41.06	M092	CRAWFORD, TERRI		9000613	MED PYMT SUPP	41.06

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
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19851	09/29/06	41.06	M095	DIXON, GEORGE		9000614	MED PYMT SUPP	41.06	
19852	09/29/06	41.06	M096	DRAKE, JUDITH		9000615	MED PYMT SUPP	41.06	
19853	09/29/06	41.06	M098	FAUCI, SUSAN		9000616	MED PYMT SUPP	41.06	
19854	09/29/06	41.06	M099	FIKE, LOUIS		9000617	MED PYMT SUPP	41.06	
19855	09/29/06	41.06	M101	GOES, ALAN		9000618	MED PYMT SUPP	41.06	
19856	09/29/06	20.15	M103	JEMISON, MAURICE		9000619	MED PYMT SUPP	20.15	
19857	09/29/06	41.06	M104	JUSSEL, PETE		9000620	MED PYMT SUPP	41.06	
19858	09/29/06	20.15	M105	KOHAMA, MARY		9000621	MED PYMT SUPP	20.15	
19859	09/29/06	20.15	M106	LYALL, JOHN		9000622	MED PYMT SUPP	20.15	
19860	09/29/06	41.06	M108	MILLER, FOREST		9000623	MED PYMT SUPP	41.06	
19861	09/29/06	20.15	M111	SANCHEZ, FELIX		9000624	MED PYMT SUPP	20.15	
19862	09/29/06	41.06	M112	SILVA, EDUARDO		9000625	MED PYMT SUPP	41.06	
19863	09/29/06	41.06	M115	WILLIAMS, CHRIS		9000626	MED PYMT SUPP	41.06	
19864	09/29/06	60.00	R454	CANALES, EVA		9682	PARACRUZ PREPAID	60.00	
19865	09/29/06	1,194.49	R455	CEJA, MARIA		9683	SETTLEMENT/ RISK	1,194.49	
19866	09/29/06	1,604.98	R456	AMERIPRISE INSURANCE COMPANY		9684	SETTLEMENT/RISK	1,604.98	
19867	09/29/06	32.46	R457	KENSINGER, NANCY SUE		9685	SETTLEMENT/RISK	32.46	
19868	09/29/06	528.50	R458	CHAPPELL, KELLY		9686	SETTLEMENT/RISK	528.50	
TOTAL		2,533,571.00		COAST COMMERCIAL BANK			TOTAL CHECKS	427	2,533,571.00

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Santa Cruz METRO September 2006 Ridership Report

FAREBOX REVENUE AND RIDERSHIP SUMMARY BY ROUTE

ROUTE	REVENUE	RIDERSHIP	UC		UC Staff		S/D		S/D		Cabrillo	Bike	Passes/ Free Rides
			Student	Faculty	Day Pass	Riders	W/C	Day Pass					
10	\$ 2,189.14	23,924	18,251	2,765	15	72	14	17	189	637	1,351		
13	\$ 374.56	7,487	6,714	354	3	12	1	-	30	146	150		
15	\$ 1,278.41	28,057	25,069	1,350	5	40	7	8	143	608	677		
16	\$ 6,570.13	73,327	59,883	4,965	26	213	42	10	539	1,805	3,697		
19	\$ 1,838.54	20,534	16,390	1,726	9	103	14	15	191	474	1,041		
3B	\$ 1,094.70	2,526	274	149	21	65	23	28	169	141	1,207		
4	\$ 1,281.84	4,375	318	68	16	161	87	39	193	105	2,771		
7	\$ 419.59	1,114	73	29	7	55	21	8	76	13	640		
7N	\$ 380.75	484	5	15	-	16	-	1	20	35	185		
9	\$ 384.90	536	9	22	8	3	1	1	5	9	270		
12A	\$ 29.25	644	525	92	-	2	-	-	-	21	7		
20	\$ 2,357.57	20,412	15,722	1,311	23	86	8	6	275	506	1,522		
31	\$ 1,382.51	1,855	31	58	26	16	16	2	59	74	862		
32	\$ 396.78	627	17	13	1	8	6	-	19	25	338		
33	\$ 345.57	564	2	-	-	2	-	1	4	-	307		
34	\$ 156.87	194	-	-	-	1	-	-	4	-	90		
35	\$ 27,943.61	41,464	572	496	274	1,018	100	173	1,505	1,695	21,062		
40	\$ 1,695.80	2,135	27	20	40	55	1	5	6	49	1,047		
41	\$ 1,275.44	1,828	141	99	7	55	-	5	92	146	680		
42	\$ 961.90	1,211	108	21	6	63	-	4	60	157	393		
53	\$ 492.18	829	1	21	5	80	32	5	39	11	434		
54	\$ 512.24	894	9	13	2	45	12	6	115	39	418		
55	\$ 1,364.62	4,006	27	39	13	148	80	25	1,588	102	1,442		
56	\$ 476.70	1,223	5	2	3	29	27	10	339	26	571		
66	\$ 9,885.44	15,563	981	440	126	590	161	46	798	481	6,907		
68	\$ 5,585.80	9,518	875	321	84	273	82	36	501	317	4,234		
68N	\$ 1,057.09	1,698	241	68	-	30	11	1	115	120	568		
69	\$ 5,883.67	10,337	843	594	71	341	75	31	435	303	4,570		
69A	\$ 17,312.66	22,653	840	622	178	1,127	195	127	860	725	8,631		
69N	\$ 1,473.66	2,610	261	112	2	58	23	-	410	174	865		
69W	\$ 17,860.13	26,921	1,050	733	180	989	257	120	3,801	869	9,622		
70	\$ 2,970.47	6,848	160	105	20	148	64	18	2,487	251	2,123		
71	\$ 52,725.83	72,585	1,769	1,395	341	3,018	497	315	10,191	2,620	23,828		
72	\$ 4,096.86	4,490	19	18	38	314	13	51	256	68	1,485		
74	\$ 2,657.43	2,851	5	14	29	132	12	21	102	15	960		
75	\$ 8,720.25	8,963	15	61	79	715	28	48	337	136	2,761		
76	\$ 847.96	937	3	7	9	49	2	20	11	5	381		
79	\$ 1,721.48	2,118	18	29	33	188	99	83	123	18	864		
88	\$ -	-	-	-	-	-	-	-	-	-	-		
91	\$ 4,232.23	5,889	62	138	104	99	14	16	1,051	288	1,839		
Unknown	\$ 110.26	1,514	-	62	10	2	1	4	25	8	4		
TOTAL	\$192,344.82	435,745	151,315	18,347	1,814	10,421	2,026	1,306	27,163	13,222	110,804		

ROUTE	REVENUE	RIDERSHIP	VTA/SC Day Pass	CalTrain	17 Day Pass	S/D Riders	W/C	METRO	ECO Pass	Bike	Monthly Pass
17	\$ 39,489.31	20,751	26	70	116	1,356	54	5,008	97	1,346	11,106

RIDERSHIP	
Night Owl	2,543
UC Shuttle	3,615
TOTAL	6,158

September Ridership	462,654
September Revenue	\$232,024.74

5-3.1

BUS OPERATOR LIFT TEST *PULL-OUT*

VEHICLE CATEGORY	TOTAL BUSES	AVG # DEAD IN GARAGE	AVG # AVAIL. FOR SERVICE	AVG # IN SERVICE	AVG # SPARE BUSES	AVG # LIFTS OPERATING	% LIFTS WORKING ON PULL-OUT BUSES
FLYER/HIGHWAY 17 - 40'	7	0	7	0	7	0	100%
FLYER/LOW FLOOR - 40'	12	1	11	7	4	7	100%
FLYER/LOW FLOOR - 35'	18	5	13	9	4	9	100%
FLYER/HIGH FLOOR - 35'	15	2	13	4	9	4	100%
GILLIG/SAM TRANS - 40'	10	1	9	3	6	3	100%
DIESEL CONVERSION - 35'	15	2	13	12	1	12	100%
DIESEL CONVERSION - 40'	14	3	11	8	3	8	100%
ORION/HIGHWAY 17 - 40'	11	1	10	8	2	8	100%
GOSHEN	2	0	2	0	2	0	100%
TROLLEY	1	0	1	0	1	0	100%
CNG NEW FLYER - 40'	8	1	7	5	2	5	100%

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

PASSENGER LIFT PROBLEMS

MONTH OF SEPTEMBER 2006

BUS #	DATE	DAY	REASON
8092F	1-Sep	Friday	Kneel does not work
2203CG	18-Sep	Monday	Kneel not working well. Kneel defective.
2206CG	18-Sep	Monday	Coach doesn't seem to raise all the way up before the alarm stops
2208CG	13-Sep	Wednesday	Kneel not working
2310OR	5-Sep	Tuesday	Ramp failed to deploy
9833G	22-Sep	Friday	Lift got jammed, had to be pushed in

- F New Flyer
- G Gillig
- C Champion
- LF Low Floor Flyer
- GM GMC
- CG CNG
- CN SR855 & SR854
- OR Orion/Hwy 17

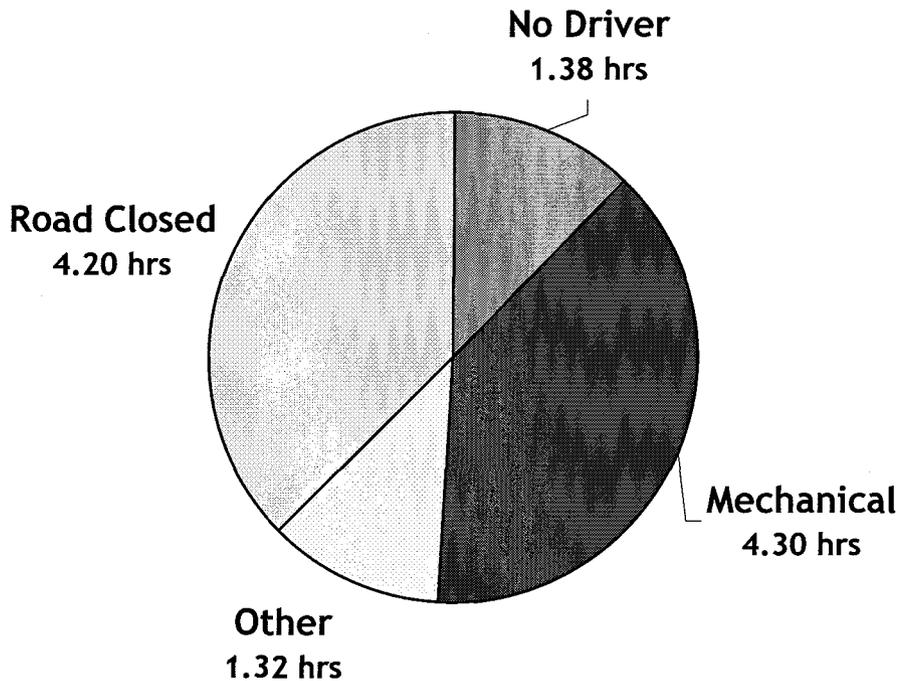
Note: Lift operating problems that cause delays of less than 30 minutes.

5-3.3

Dropped Service for FY 2007

	FY 2004/05		FY 2005/06		FY 2006/07	
	Dropped Hours	Dropped Miles	Dropped Hours	Dropped Miles	Dropped Hours	Dropped Miles
July	1.35	42.89	0	0	5.00	96.88
August	0.00	0.00	213.92	3,575.86	14.80	276.46
September	0.76	18.87	140.97	2,336.50	11.20	160.72
October	0.00	0.00	STRIKE	STRIKE		
November	0.00	0.00	113.77	1,780.56		
December	0.00	0.00	95.61	1,659.66		
January	6.07	127.13	16.49	286.31		
February	23.31	276.75	39.18	579.38		
March	8.66	99.08	21.30	380.68		
April	37.96	641.12	20.46	323.62		
May	1.50	37.03	33.23	551.00		
June	4.15	69.30	19.97	267.47		
TOTAL	83.76	1,312.17	714.90	11,741.05	31.00	534.06

Dropped Service Breakdown for September 2006



5-3.4

GOVERNMENT TORT CLAIM

RECOMMENDED ACTION

TO: Board of Directors

FROM: District Counsel

RE: Claim of: Velasco, Candido
Date of Incident: 09/06/06

Received: 09/22/06 Claim #: 06-0029
Occurrence Report No.: SC 09-06-04

In regard to the above-referenced Claim, this is to recommend that the Board of Directors take the following action:

- 1. Reject the claim entirely.
- 2. Deny the application to file a late claim.
- 3. Grant the application to file a late claim.
- 4. Reject the claim as untimely filed.
- 5. Reject the claim as insufficient.
- 6. Allow the claim in full.
- 7. Allow the claim in part, in the amount of \$ _____ and reject the balance.

By Margaret Gallagher Date: _____
Margaret Gallagher
DISTRICT COUNSEL

I, Cindi Thomas, do hereby attest that the above Claim was duly presented to and the recommendations were approved by the Santa Cruz Metropolitan Transit District's Board of Directors at the meeting of October 27, 2006.

By _____ Date: _____
Cindi Thomas
RECORDING SECRETARY

MG/lg
Attachment(s)

ENGLISH TRANSLATION OF SPANISH LANGUAGE
CLAIM AGAINST THE SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
(Pursuant to Section 910 et Seq., Government Code)
Claim #06-0029

TO: BOARD OF DIRECTORS, Santa Cruz Metropolitan Transit District

ATTN: Secretary to the Board of Directors
370 Encinal Street, Suite 100
Santa Cruz, CA 95060

1. Claimant's Name: **Candido Velasco**
Claimant's Address: N/A
Claimant's Phone Number: N/A
Address to which notices are to be sent: N/A
2. Occurrence: Date: **09/06/06** Time: **1:30 p.m.** Place: **Capitola Mall**
3. Circumstances of occurrence or transaction giving rise to claim: **"The bus that Ruben Jose was driving hit my truck."**
4. General description of indebtedness, obligation, injury, damage, or loss incurred so far as is known:
5. Name or names of public employees or employees causing injury, damage, or loss, if known: **Ruben Jose Valdez**
6. Amount claimed now\$
Estimated amount of future loss, if known\$
TOTAL . .(doctors and hospital bills are pending)\$
7. Basis of above computations:

(see original for claimant signature)

09/20/06

CLAIMANT'S SIGNATURE OR
COMPANY REPRESENTATIVE'S SIGNATURE OR
PARENT OF MINOR CLAIMANT'S SIGNATURE

DATE

Note: Claim must be presented to the Secretary to the Board of Directors, Santa Cruz Metropolitan Transit District

Attachments (repair estimate) in file

RECLAMO CONTRA EL DISTRITO METROPOLITANO DE TRÁNSITO DE SANTA CRUZ

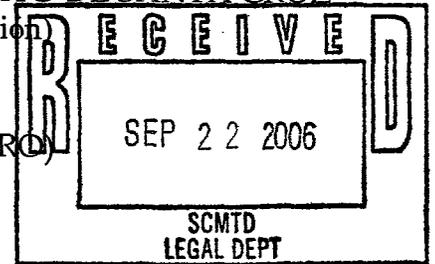
(Según Sección 910 y Seguimiento de Código de Gobernación)

Reclamo # AR14223

06-0029

Para: Junta Directiva, Santa Cruz Metropolitan Transit District (METRO)

Attn: Secretary to the Board of Directors
370 Encinal Street, Suite 100
Santa Cruz, CA 95060



1. Nombre del Demandante Cándido Velasco
Dirección del Demandante _____
Teléfono del Demandante _____
Dirección/Caseta Postal a donde enviar notificaciones la misma
2. Ocurrencia EL autobus que manejaba Ruben Jose le pegó a mi
Fecha 9-06-06 Hora 1:30 pm Sitio Capitola mall Camioneta
3. Circunstancias de la ocurrencia o transacción de donde proviene la demanda:

4. Descripción de deudas, obligaciones, lesiones, daños o pérdida, si se sabe:

5. Nombre o nombres de empleados públicos que causaron lesiones, daños, o pérdidas, si se sabe: Ruben Jose Valdez
6. Cantidad reclamada ahora \$ _____
Presupuesto de futuras pérdidas, si se sabe \$ _____
TOTAL \$ _____
7. Base de las computaciones anteriores: _____

Cándido Velasco
FIRMA DEL DEMANDANTE (o Representante
o Padre/Madre del Menor)

Cándido Velasco
Fecha 9-20-06

Nota: Esta demanda debe ser presentada a la Secretaria de la Junta Directiva, Santa Cruz Metropolitan Transit District (METRO)

GOVERNMENT TORT CLAIM

RECOMMENDED ACTION

TO: Board of Directors

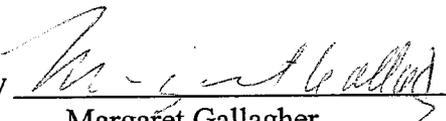
FROM: District Counsel

RE: Claim of: Ramsay, John
Date of Incident: 09/24/06

Received: 09/25/06 Claim #: 06-0028
Occurrence Report No.: MISC 06-14

In regard to the above-referenced Claim, this is to recommend that the Board of Directors take the following action:

- 1. Reject the claim entirely.
- 2. Deny the application to file a late claim.
- 3. Grant the application to file a late claim.
- 4. Reject the claim as untimely filed.
- 5. Reject the claim as insufficient.
- 6. Allow the claim in full.
- 7. Allow the claim in part, in the amount of \$ _____ and reject the balance.

By 
Margaret Gallagher
DISTRICT COUNSEL

Date: _____

I, Cindi Thomas, do hereby attest that the above Claim was duly presented to and the recommendations were approved by the Santa Cruz Metropolitan Transit District's Board of Directors at the meeting of October 27, 2006.

By _____
Cindi Thomas
RECORDING SECRETARY

Date: _____

MG/lg
Attachment(s)

5-4.4

CLAIM AGAINST THE SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

(Pursuant to Section 910 et Seq., Government Code)

Claim # 06-0028

TO: BOARD OF DIRECTORS, Santa Cruz Metropolitan Transit District

ATTN: Secretary to the Board of Directors
370 Encinal Street, Suite 100
Santa Cruz, CA 95060

1. Claimant's Name: John Ramsay

Claimant's Address/Post Office Box: _____

Claimant's Phone Number: _____

2. Address to which notices are to be sent: _____

3. Occurrence: Bus driver put suitcase under bus and bag ripped apart.

Date: 9-24-06 Time: _____ Place: _____

Circumstances of occurrence or transaction giving rise to claim: Bus driver put bag under bus ripping zippers and tearing on bag.

4. General description of indebtedness, obligation, injury, damage, or loss incurred so far as is known: Need new suitcase & clean clothes

5. Name or names of public employees or employees causing injury, damage, or loss, if known: _____

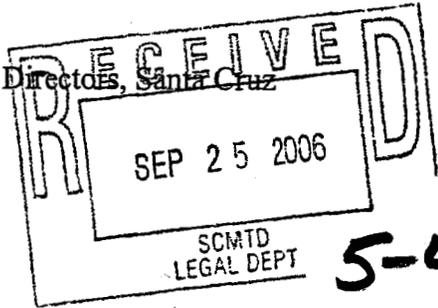
6. Amount claimed now	\$ <u>158.99</u>	<u>bag cost</u>
Estimated amount of future loss, if known	\$ <u>18.00</u>	<u>clean clothes</u>
TOTAL	\$ <u>173.99</u>	

7. Basis of above computations: _____ Not counting tax

[Signature]
CLAIMANT'S SIGNATURE (or Company Representative or Parent of Minor Claimant)

9-25-06
DATE

Note: Claim must be presented to the Secretary to the Board of Directors, Santa Cruz Metropolitan Transit District



GOVERNMENT TORT CLAIM

RECOMMENDED ACTION

TO: Board of Directors

FROM: District Counsel

RE: Claim of: Sumano, Zenaída
Date of Incident: 09/06/06

Received: 10/02/06 Claim #: 06-0031
Occurrence Report No.: SC 09-06-04

In regard to the above-referenced Claim, this is to recommend that the Board of Directors take the following action:

- 1. Reject the claim entirely.
- 2. Deny the application to file a late claim.
- 3. Grant the application to file a late claim.
- 4. Reject the claim as untimely filed.
- 5. Reject the claim as insufficient.
- 6. Allow the claim in full.
- 7. Allow the claim in part, in the amount of \$ _____ and reject the balance.

By Margaret Gallagher
Margaret Gallagher
DISTRICT COUNSEL

Date: 10/09/06

I, Cindi Thomas, do hereby attest that the above Claim was duly presented to and the recommendations were approved by the Santa Cruz Metropolitan Transit District's Board of Directors at the meeting of October 27, 2006.

By _____
Cindi Thomas
RECORDING SECRETARY

Date: _____

MG/lg
Attachment(s)

5-4.6

ENGLISH TRANSLATION OF SPANISH LANGUAGE
CLAIM AGAINST THE SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
(Pursuant to Section 910 et Seq., Government Code)
Claim #06-0031

TO: BOARD OF DIRECTORS, Santa Cruz Metropolitan Transit District

ATTN: Secretary to the Board of Directors
370 Encinal Street, Suite 100
Santa Cruz, CA 95060

1. Claimant's Name: **Zenaida Sumano**
Claimant's Address:
Claimant's Phone Number:
Address to which notices are to be sent:
2. Occurrence: Date: **09/06/06** Time: **1:30 pm** Place: **Capitola Mall**
3. Circumstances of occurrence or transaction giving rise to claim: **When I, Candido Velasco, was passing in front of the Capitola Mall, the bus was coming towards me and damaged the right light of my truck.**
4. General description of indebtedness, obligation, injury, damage, or loss incurred so far as is known: **Zenaida visited the chiropractor and my policy covered her expenses.**
5. Name or names of public employees or employees causing injury, damage, or loss, if known: **Ruben Jose Valdez**
6. Amount claimed now \$ **1,000.00**
Estimated amount of future loss, if known \$
TOTAL ..(doctors and hospital bills are pending) \$ **1,000.00**
7. Basis of above computations:

(see original for claimant signature)

CLAIMANT'S SIGNATURE OR
COMPANY REPRESENTATIVE'S SIGNATURE OR
PARENT OF MINOR CLAIMANT'S SIGNATURE

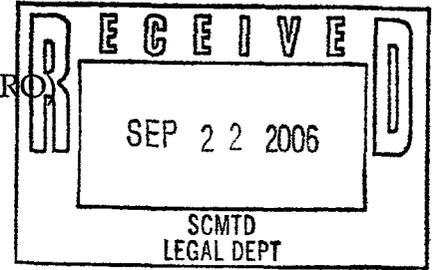
09/20/06
DATE

Note: Claim must be presented to the Secretary to the Board of Directors, Santa Cruz Metropolitan Transit District

5-4.7

RECLAMO CONTRA EL DISTRITO METROPOLITANO DE TRÁNSITO DE SANTA CRUZ
(Según Sección 910 y Seguimiento de Código de Gobernación)

Reclamo # AR14223
06-0031



Para: Junta Directiva, Santa Cruz Metropolitan Transit District (METRO)

Attn: Secretary to the Board of Directors
370 Encinal Street, Suite 100
Santa Cruz, CA 95060

1. Nombre del Demandante Zenaida Sumano
Dirección del Demandante _____
Teléfono del Demandante _____
Dirección/Caseta Postal a donde enviar notificaciones _____

2. Ocurrencia Lastimadura en el hombro derecho
Fecha 9-06-06 Hora 1:30 pm Sitio Capitol mall

3. Circunstancias de la ocurrencia o transacción de donde proviene la demanda:
Cuando yo Candido Velasco estaba pasando en frente de capitol mall el autobus venia hacia mi y dañó mi camioneta por el faro derecho

4. Descripción de deudas, obligaciones, lesiones, daños o pérdida, si se sabe:
~~nosotros estamos~~ Zenaida ya visito al quiropodista y pose mi pólisa para que cubra los gastos de este

5. Nombre o nombres de empleados públicos que causaron lesiones, daños, o pérdidas, si se sabe: Ruben Jose Valdez

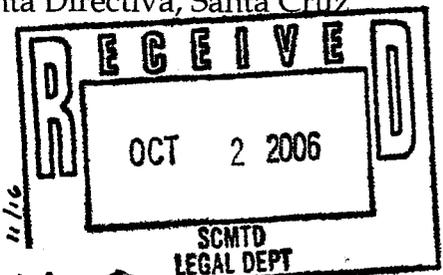
6. Cantidad reclamada ahora	\$ <u>1000.00</u>
Presupuesto de futuras pérdidas, si se sabe	\$ _____
TOTAL	\$ <u>1,000.00</u>

7. Base de las computaciones anteriores: _____

Zenaida Sumano
FIRMA DEL DEMANDANTE (o Representante
o Padre/Madre del Menor)

9-20-06
Fecha

Nota: Esta demanda debe ser presentada a la Secretaria de la Junta Directiva, Santa Cruz Metropolitan Transit District (METRO)



5-4.8



Agenda
METRO Advisory Committee

6:00 pm
October 18, 2006
920 Pacific Avenue
Santa Cruz, California

1. Roll Call
2. Agenda Additions/Deletions
3. Oral/Written Communication
4. Consideration of Minutes of August 16, 2006 (No Meeting in September, Lack of Quorum)
5. Ridership Reports for July and August 2006
6. ParaCruz Operations Status Reports for May and June 2006
7. Discussion of Ridership Report Improvements
8. Discussion of Airport Transit Brochure
9. Discussion of METRO Smoking/Non-Smoking Policy In and Around Transit Centers Including Consideration of Public Opinion
10. Consideration of Need for Security Guards/Surveillance at the Watsonville Transit Center and Whether There is Available Funding
11. Consideration Of Requirements Regarding Priority Seating On The Buses
12. Discussion of Service to UCSC
13. Discussion of Customer Service
14. Communications to METRO General Manager
15. Communications to METRO Board of Directors
16. Items for Next Meeting Agenda
17. Adjournment

Next Meeting: Wednesday November 15, 2006 @ 6:00 pm
Santa Cruz Metro Conference Room

5-5.1

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Minutes - METRO Advisory Committee (MAC)

August 16, 2006

A Regular Meeting of the METRO Advisory Committee (MAC) met on Wednesday, August 16, 2006 at the METRO Center Conference Room, 920 Pacific Avenue, Santa Cruz, CA.

Chair Robert Yount called the meeting to order at 6:15 p.m.

1. ROLL CALL:

MEMBERS PRESENT

Norm Hagen, Vice Chair
Naomi Gunther
Paul Marcelin-Sampson
Dennis Papadopulo
Dave Williams
Robert Yount, Chair

VISITORS PRESENT

None

MEMBERS ABSENT

Dan Alper
Mara Murphey
Stuart Rosenstein
Leslie Wright

STAFF PRESENT

Ciro Aguirre, Operations Manager
Margaret Gallagher, District Counsel
Les White, General Manager

2. AGENDA ADDITIONS/DELETIONS

None.

3. ORAL/WRITTEN COMMUNICATION

Les White invited the MAC members to attend the Congressman Sam Farr presentation of Appreciation Resolution at the METRO Center on August 17, 2006 at 2:00 p.m.

4. CONSIDERATION OF MINUTES OF JULY 19, 2006

**ACTION: MOTION: ROBERT YOUNT SECOND: DENNIS
PAPADOPULO**

ACCEPT AND FILE MINUTES OF THE JULY MEETING AS PRESENTED.

Motion passed unanimously with Dan Alper, Mara Murphy, Stuart Rosenstein and Leslie Wright being absent.

5. RIDERSHIP REPORT OF JUNE 2006

Paul Marcelin-Sampson distributed the Key for the Ridership Report, which is attached to the file copy of these minutes. He discussed how to read the Key and what the columns represented.

Chair Robert Yount asked Les White how close the statistics are to 2005. Les White responded by saying he did not have the information at hand but could provide a fiscal year chart representing the comparison at the September meeting of MAC. Chair Robert Yount asked Mr. White if the budget was adequate. Mr. White responded affirmatively.

5-5.2

Paul Marcelin-Sampson responded by saying the reports cannot be viewed as absolutes because of the many variables in route changes, seasonal ridership and road construction. Naomi Gunther and Les White supported Mr. Marcelin-Sampson's statement by briefly speaking about Route 10, the High Street construction and the upcoming Mission Street underground utility construction.

6. PARACRUZ OPERATIONS STATUS REPORT FOR APRIL 2006

Chair Robert Yount commented favorably on the cost per ride in the report. Vice Chair Norm Hagen stated that shared rides are preferred from a cost effective perspective. Chair Robert Yount asked Les White when the service would be upgraded to accomodate 3 wheelchairs per ride. Les White explained that ParaCruz currently has retrofitted vehicles that will allow for 3 wheelchairs. Mr. White offered additional information on the timeline of new vehicles and how it was directly related to the bond measure. Mr. White stated that it is the intention of the SCMTD to replace the majority of the smaller vans with midsize and larger vehicles.

ITEM 12 WAS TAKEN OUT OF ORDER AT THIS TIME

12. PROPOSAL TO END MAC MEETINGS BY 7:55 TO ALLOW TRANSIT RIDERS TIME TO BOARD BUSES DEPARTING ON THE HOUR

Naomi Gunther explained the reason she had suggested this item to be placed on the agenda was to allow MAC members and visitors enough time to board buses that depart on the hour. Chair Robert Yount voiced his concern on voting items that are towards the end of the meeting. Many suggestions were made as to starting the meeting earlier and ending earlier to allow enough time for all items on agenda to be addressed. Norm Hagen suggested that everyone make a commitment to arrive to the meetings on time.

ACTION: MOTION: NAOMI GUNTHER SECOND: PAUL MARCELIN-SAMPSON

ACCEPT PROPOSAL TO END MAC MEETINGS BY 7:55 TO ALLOW TRANSIT RIDERS TIME TO BOARD BUSES DEPARTING ON THE HOUR.

Motion passed unanimously with Dan Alper, Mara Murphy, Stuart Rosenstein and Leslie Wright being absent.

ITEM 9 WAS TAKEN OUT OF ORDER AT THIS TIME

9. CONSIDERATION OF NEED FOR SECURITY GUARDS AT THE WATSONVILLE TRANSIT CENTER AND WHETHER THERE IS AVAILABLE FUNDING

Les White distributed a document titled Watsonville Transit Center Security Proposal, which is attached to the file copy of these minutes. The document contains 3 proposals for service including the SCMTD's recommended proposal.

Vice Chair Norm Hagen expressed his concern for individual safety of the public in the Watsonville Transit Center especially in the non-daylight hours. Chair Robert Yount

suggested adjusting the hours of security to coincide with the non-daylight hours. Les White explained that variations of the proposals would increase the costs. Ciro Aguirre clarified the proposals by giving more detailed information on the hours of coverage and how that related to the cost. Les White explained that the security services have a 2 hour minimum of coverage. Chair Robert Yount stated that dividing up the times of service may be an option.

Paul Marcelin-Sampson asked Les White where the money to provide security service would come from. Mr. White explained that once security services are approved the money would have to be taken from other areas of the balanced budget.

Ciro Aguirre explained that proposal #3 was based on actual complaints from riders, bus operators and transit center vendors.

Naomi Gunther voiced her concern regarding the budget and suggested changing the hours on proposal #3 to cover a later time frame in order to select the SCMTD recommended proposal.

Les White gave a brief history of security at the Watsonville Transit Center including the police substation, which is currently unstaffed. Mr. White stated that SCMTD Board of Directors Vice Chair Marcela Tavantzis brought up the issue of security at the center during the budget process. Ms. Tavantzis' concern was whether or not security was an issue. Mr. White stated that the Board referred the issue back to MAC to discuss: a) whether or not there was a security issue, b) what type of issue existed and, c) what recommendations MAC would have. Les White stated that the police substation would not be re-staffed for at least 2 fiscal years if at all.

Les White discussed outside funding for transit agencies security including state and federal grants.

Paul Marcelin-Sampson stated that he feels that the police department has a certain amount of responsibility to provide security to the Watsonville Transit Center just as it would to all aspects of protecting the public.

Les White stated he would share the MAC information and concerns with the Board. Mr. White also stated that he and Ciro Aguirre would research the options and return a proposal to MAC in September. This item was carried over to the September 20, 2006 MAC meeting.

7. DISCUSSION OF PARACRUZ CUSTOMER GUIDE CHANGES

Chair Robert Yount stated that Steve Paulson requested MAC members to send their comments, suggestions and changes to him in writing. Mr. Yount also stated Steve Paulson had informed him that the E&D TAC has put together a subcommittee that will report their recommendations in October.

Chair Robert Yount read through his copy including changes he would recommend. At the request of Margaret Gallagher it was agreed that any recommended changes be in writing in order to reduce the risk of misinterpretation.

Discussion continued regarding the meanings of certain sections and the legalities concerning specific requirements. Chair Robert Yount gave his change recommendations in hard copy form to the Administrative Assistant taking minutes to be delivered to Steve Paulson.

The meeting quorum was lost at this time due to the departure of Dennis Papdulo

ADJOURN

Due to the departure of Dennis Papadopulo, the meeting quorum was lost and Chair Robert Yount adjourned the meeting at 7:50 pm.

Respectfully submitted,



Dale Hamilton
ADMINISTRATIVE ASSISTANT

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Elisabeth Ross, Manager of Finance
SUBJECT: MONTHLY BUDGET STATUS REPORT FOR JULY 2006 AND APPROVAL OF BUDGET TRANSFERS

I. RECOMMENDED ACTION

Staff recommends that the Board of Directors approve the budget transfers for the period of August 1 – 31, 2006.

II. SUMMARY OF ISSUES

- Operating revenue for the year to date totals \$1,839,198 or \$58,034 over the amount of revenue expected to be received during the first month of the fiscal year.
- Total operating expenses for the year to date in the amount of \$2,947,572 are at 8.2% of the budget.
- A total of \$427,704 has been expended through July 31st for the FY 06-07 Capital Improvement Program.

III. DISCUSSION

An analysis of the District's budget status is prepared monthly in order to apprise the Board of Directors of the District's actual revenues and expenses in relation to the adopted operating and capital budgets for the fiscal year. The attached monthly revenue and expense report represents the status of the District's FY 06-07 budget as of July 31, 2006. The fiscal year is 8.3% elapsed.

A. Operating Revenues

Revenues are \$58,034 over the amount to be received for the period. Variances are explained in the notes following the report.

B. Operating Expenses

Operating expenses for the year to date total \$2,947,572 or 8.2% of the budget, with 8.3% of the year elapsed. Variances are explained in the notes following the report.

C. Capital Improvement Program

For the year to date, a total of \$427,704 has been expended on the Capital Improvement Program. Of this, \$342,895 has been spent on MetroBase.

5-6.1

IV. FINANCIAL CONSIDERATIONS

Approval of the budget transfers will increase some line item expenses and decrease others. Overall, the changes are expense-neutral.

V. ATTACHMENTS

Attachment A: Revenue and Expense Report for July 2006, and Budget Transfers

5-6.2

MONTHLY REVENUE AND EXPENSE REPORT
 OPERATING REVENUE - JULY 2006

Attachment **A**

Operating Revenue	FY 06-07 Budgeted for Month	FY 06-07 Actual for Month	FY 06-07 Budgeted YTD	FY 05-06 Actual YTD	FY 06-07 Actual YTD	YTD Variance from Budgeted	
Passenger Fares	\$ 302,947	\$ 273,576	\$ 302,947	\$ 297,007	\$ 273,576	\$ (29,371)	
Paratransit Fares	\$ 19,011	\$ 19,931	\$ 19,011	\$ 17,642	\$ 19,931	\$ 920	
Special Transit Fares	\$ 66,376	\$ 68,895	\$ 66,376	\$ 63,458	\$ 68,895	\$ 2,519	
Highway 17 Revenue	\$ 87,005	\$ 99,546	\$ 87,005	\$ 83,659	\$ 99,546	\$ 12,541	
<i>Subtotal Passenger Rev</i>	\$ 475,339	\$ 461,948	\$ 475,339	\$ 461,766	\$ 461,948	\$ (13,391)	See Note 1
Advertising Income	\$ 10,000	\$ 26,725	\$ 10,000	\$ 2,025	\$ 26,725	\$ 16,725	See Note 2
Commissions	\$ 500	\$ 563	\$ 500	\$ 524	\$ 563	\$ 63	
Rent Income	\$ 11,932	\$ 13,329	\$ 11,932	\$ 11,518	\$ 13,329	\$ 1,397	See Note 3
Interest - General Fund	\$ 75,068	\$ 102,380	\$ 75,068	\$ 58,487	\$ 102,380	\$ 27,312	See Note 4
Non-Transportation Rev	\$ 88,125	\$ 144,853	\$ 88,125	\$ 663	\$ 144,853	\$ 56,728	See Note 5
Sales Tax Income	\$ 1,120,200	\$ 1,089,400	\$ 1,120,200	\$ 1,120,200	\$ 1,089,400	\$ (30,800)	See Note 6
TDA Funds	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
FTA Op Asst - Sec 5307	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
FTA Op Asst - Sec 5311	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
FY 05-06 Carryover	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Transfer from Reserves	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Transfer from Insurance Reserves	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Transfer - Proj Mgr	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Total Operating Revenue	\$ 1,781,164	\$ 1,839,198	\$ 1,781,164	\$ 1,655,183	\$ 1,839,198	\$ 58,034	

5-6.a1

**MONTHLY REVENUE AND EXPENSE REPORT
OPERATING EXPENSE SUMMARY - JULY 2006**

	FY 06-07 Final Budget	FY 06-07 Revised Budget	FY 05-06 Expended YTD	FY 06-07 Expended YTD	Percent Expended of Budget	
PERSONNEL ACCOUNTS						
Administration	\$ 966,287	\$ 966,287	\$ 58,885	\$ 75,017	7.8%	
Finance	\$ 572,352	\$ 572,352	\$ 42,282	\$ 34,337	6.0%	
Customer Service	\$ 482,804	\$ 482,804	\$ 28,936	\$ 35,592	7.4%	
Human Resources	\$ 468,664	\$ 468,664	\$ 27,602	\$ 35,846	7.6%	
Information Technology	\$ 466,252	\$ 466,252	\$ 29,284	\$ 39,162	8.4%	See Note 7
District Counsel	\$ 404,446	\$ 404,446	\$ 36,258	\$ 31,879	7.9%	
Facilities Maintenance	\$ 946,857	\$ 946,857	\$ 73,878	\$ 82,265	8.7%	See Note 7
Paratransit Program	\$ 2,913,145	\$ 2,913,145	\$ 259,501	\$ 247,991	8.5%	See Note 7
Operations	\$ 2,010,685	\$ 2,010,685	\$ 116,569	\$ 194,213	9.7%	See Note 7
Bus Operators	\$ 13,634,430	\$ 13,634,430	\$ 929,866	\$ 1,109,038	8.1%	
Fleet Maintenance	\$ 3,928,485	\$ 3,928,485	\$ 281,339	\$ 311,294	7.9%	
Retired Employees/COBRA	\$ 1,251,291	\$ 1,251,291	\$ 81,945	\$ 187,307	15.0%	See Note 7
Total Personnel	\$ 28,045,699	\$ 28,045,699	\$ 1,966,343	\$ 2,383,941	8.5%	
NON-PERSONNEL ACCOUNTS						
Administration	\$ 706,589	\$ 706,589	\$ 77,644	\$ 88,245	12.5%	See Note 8
Finance	\$ 937,123	\$ 937,123	\$ 45,278	\$ 49,377	5.3%	
Customer Service	\$ 112,469	\$ 112,469	\$ 1,494	\$ 1,138	1.0%	
Human Resources	\$ 61,733	\$ 61,733	\$ 750	\$ 10,152	16.4%	See Note 9
Information Technology	\$ 138,140	\$ 138,140	\$ 23,559	\$ 15,783	11.4%	See Note 10
District Counsel	\$ 17,943	\$ 17,943	\$ 9,811	\$ 1,584	8.8%	See Note 11
Risk Management	\$ 245,027	\$ 245,027	\$ 801	\$ 4,733	1.9%	
Facilities Maintenance	\$ 378,572	\$ 378,572	\$ 20,634	\$ 29,485	7.8%	
Paratransit Program	\$ 732,898	\$ 732,898	\$ 36,473	\$ 58,941	8.0%	
Operations	\$ 619,922	\$ 619,922	\$ 23,324	\$ 46,472	7.5%	
Bus Operators	\$ 5,000	\$ 5,000	\$ -	\$ -	0.0%	
Fleet Maintenance	\$ 3,958,386	\$ 3,958,386	\$ 231,499	\$ 257,702	6.5%	
SCCIC	\$ 500	\$ 500	\$ -	\$ 20	4.0%	
Total Non-Personnel	\$ 7,914,301	\$ 7,914,301	\$ 471,267	\$ 563,632	7.1%	
Total Operating Expense	\$ 35,960,000	\$ 35,960,000	\$ 2,437,609	\$ 2,947,572	8.2%	
YTD Operating Revenue Over YTD Expense				\$ (1,108,374)		

**CONSOLIDATED OPERATING EXPENSE
JULY 2006**

	FY 06-07 Final Budget	FY 06-07 Revised Budget	FY 05-06 Expended YTD	FY 06-07 Expended YTD	% Exp YTD of Budget	
LABOR						
Operators Wages	\$ 8,548,386	\$ 8,548,386	\$ 564,397	\$ 532,459	6.2%	
Operators Overtime	\$ 1,359,914	\$ 1,359,914	\$ 88,578	\$ 87,409	6.4%	
Other Salaries & Wages	\$ 6,048,264	\$ 6,048,264	\$ 388,769	\$ 434,219	7.2%	
Other Overtime	\$ 246,200	\$ 246,200	\$ 4,488	\$ 13,290	5.4%	
	\$ 16,202,764	\$ 16,202,764	\$ 1,046,233	\$ 1,067,376	6.6%	
FRINGE BENEFITS						
Medicare/Soc Sec	\$ 245,815	\$ 245,815	\$ 13,359	\$ 14,273	5.8%	
PERS Retirement	\$ 2,078,184	\$ 2,078,184	\$ 171,317	\$ 140,123	6.7%	
Medical Insurance	\$ 3,876,236	\$ 3,876,236	\$ 278,040	\$ 651,237	16.8%	See Note 7
Dental Plan	\$ 481,836	\$ 481,836	\$ 40,294	\$ 36,837	7.6%	
Vision Insurance	\$ 153,182	\$ 153,182	\$ 11,158	\$ 11,711	7.6%	
Life Insurance	\$ 46,691	\$ 46,691	\$ 3,949	\$ 3,720	8.0%	
State Disability Ins	\$ 349,704	\$ 349,704	\$ 15,184	\$ 16,003	4.6%	
Long Term Disability Ins	\$ 201,006	\$ 201,006	\$ 15,220	\$ 14,816	7.4%	
Unemployment Insurance	\$ 91,645	\$ 91,645	\$ 64	\$ 643	0.7%	
Workers Comp	\$ 1,396,681	\$ 1,396,681	\$ 95,797	\$ 139,229	10.0%	See Note 12
Absence w/ Pay	\$ 2,832,656	\$ 2,832,656	\$ 269,942	\$ 283,777	10.0%	See Note 13
Other Fringe Benefits	\$ 89,301	\$ 89,301	\$ 5,787	\$ 4,194	4.7%	
	\$ 11,842,935	\$ 11,842,935	\$ 920,110	\$ 1,316,564	11.1%	
SERVICES						
Acctng/Admin/Bank Fees	\$ 326,850	\$ 326,850	\$ 912	\$ 199	0.1%	
Prof/Legis/Legal Services	\$ 407,172	\$ 407,172	\$ 21,028	\$ 30,839	7.6%	
Temporary Help	\$ -	\$ -	\$ 14,632	\$ 6,705	100.0%	See Note 14
Custodial Services	\$ 71,300	\$ 71,300	\$ 4,625	\$ 3,839	5.4%	
Uniforms & Laundry	\$ 39,780	\$ 39,780	\$ 3,376	\$ 2,049	5.2%	
Security Services	\$ 431,000	\$ 431,000	\$ 796	\$ 28,780	6.7%	
Outside Repair - Bldgs/Eqmt	\$ 223,551	\$ 223,551	\$ 5,702	\$ 22,091	9.9%	See Note 15
Outside Repair - Vehicles	\$ 336,051	\$ 336,051	\$ 9,573	\$ 41,528	12.4%	See Note 16
Waste Disp/Ads/Other	\$ 81,575	\$ 81,575	\$ 2,096	\$ 3,260	4.0%	
	\$ 1,917,279	\$ 1,917,279	\$ 62,739	\$ 139,289	7.3%	
CONTRACT TRANSPORTATION						
Contract Transportation	\$ -	\$ -	\$ -	\$ -	0.0%	
Paratransit Service	\$ 200,000	\$ 200,000	\$ 4,662	\$ 18,523	9.3%	See Note 17
	\$ 200,000	\$ 200,000	\$ 4,662	\$ 18,523	9.3%	
MOBILE MATERIALS						
Fuels & Lubricants	\$ 2,745,595	\$ 2,745,595	\$ 131,691	\$ 175,526	6.4%	
Tires & Tubes	\$ 201,000	\$ 201,000	\$ 29,607	\$ 13,829	6.9%	
Other Mobile Supplies	\$ 7,500	\$ 7,500	\$ 47	\$ -	0.0%	
Revenue Vehicle Parts	\$ 365,000	\$ 365,000	\$ 40,693	\$ 70,535	19.3%	See Note 18
	\$ 3,319,095	\$ 3,319,095	\$ 202,036	\$ 259,891	7.8%	

**CONSOLIDATED OPERATING EXPENSE
JULY 2006**

	FY 06-07 Final Budget	FY 06-07 Revised Budget	FY 05-06 Expended YTD	FY 06-07 Expended YTD	% Exp YTD of Budget	
OTHER MATERIALS						
Postage & Mailing/Freight	\$ 26,550	\$ 26,550	\$ 2,000	\$ 1,924	7.2%	
Printing	\$ 85,610	\$ 85,610	\$ 1,666	\$ 98	0.1%	
Office/Computer Supplies	\$ 65,400	\$ 65,400	\$ 19,908	\$ 9,978	15.3%	See Note 19
Safety Supplies	\$ 16,375	\$ 16,375	\$ 552	\$ 347	2.1%	
Cleaning Supplies	\$ 47,650	\$ 47,650	\$ 2,098	\$ 2,607	5.5%	
Repair/Maint Supplies	\$ 40,000	\$ 40,000	\$ 2,146	\$ 3,667	9.2%	See Note 20
Parts, Non-Inventory	\$ 40,500	\$ 40,500	\$ 426	\$ 1,887	4.7%	
Small Tools	\$ 12,100	\$ 12,100	\$ 347	\$ 560	4.6%	
Promo/Photo Supplies	\$ 8,805	\$ 8,805	\$ (16)	\$ 203	2.3%	
	\$ 342,990	\$ 342,990	\$ 29,127	\$ 21,270	6.2%	
UTILITIES						
	\$ 368,574	\$ 368,574	\$ 21,334	\$ 22,678	6.2%	
CASUALTY & LIABILITY						
Insurance - Prop/PL & PD	\$ 605,188	\$ 605,188	\$ 42,637	\$ 45,458	7.5%	
Settlement Costs	\$ 150,000	\$ 150,000	\$ 72	\$ 2,084	1.4%	
Repairs to Prop	\$ -	\$ -	\$ (3,166)	\$ (68,350)	0.0%	See Note 21
	\$ 755,188	\$ 755,188	\$ 39,544	\$ (20,807)	-2.8%	
TAXES						
	\$ 46,761	\$ 46,761	\$ 4,434	\$ 4,411	9.4%	See Note 22
MISC EXPENSES						
Dues & Subscriptions	\$ 56,870	\$ 56,870	\$ 36,817	\$ 38,291	67.3%	See Note 23
Advertising - Revenue Prod.	\$ 15,000	\$ 15,000	\$ -	\$ -	0.0%	
Employee Incentive Program	\$ 5,107	\$ 5,107	\$ -	\$ 67	1.3%	
Training	\$ 9,600	\$ 9,600	\$ 329	\$ (105)	-1.1%	
Travel	\$ 27,170	\$ 27,170	\$ 1,273	\$ 86	0.3%	
Other Misc Expenses	\$ 18,533	\$ 18,533	\$ (664)	\$ 614	3.3%	
	\$ 132,280	\$ 132,280	\$ 37,755	\$ 38,954	29.4%	
OTHER EXPENSES						
Leases & Rentals	\$ 832,134	\$ 832,134	\$ 69,636	\$ 79,422	9.5%	See Note 24
	\$ 832,134	\$ 832,134	\$ 69,636	\$ 79,422	9.5%	
Total Operating Expense	\$ 35,960,000	\$ 35,960,000	\$ 2,437,609	\$ 2,947,572	8.2%	

**MONTHLY REVENUE AND EXPENSE REPORT
FY 06-07 CAPITAL IMPROVEMENT PROGRAM**

CAPITAL PROJECTS	Final Program Budget	Expended in July	YTD Expended
Grant Funded Projects			
MetroBase	\$ 29,622,709	\$ 342,895	\$ 342,895
Revenue Vehicle Replacement	\$ 920,000	\$ -	
Short Range Transit Plan	\$ 100,000	\$ -	
CNG Bus Conversions	\$ 6,800,000	\$ 17,716	\$ 17,716
	\$ 37,442,709		
District Funded Projects			
Bus Stop Imprvmts/Bus Shelter Projects	\$ 310,000	\$ 2,880	\$ 2,880
Revenue Vehicle Replacement	\$ 192,000	\$ 12,351	\$ 12,351
Rebuild Low Floor Buses	\$ 152,000		
IT Projects	\$ 10,000		
Facilities Repairs & Improvements	\$ 113,500		
Non-Revenue Vehicle Replacement	\$ 235,000	\$ 51,862	\$ 51,862
Office Equipment	\$ 16,600		
Diagnostic Reader/Fleet	\$ 3,000		
Mt. Biewlaski Repeater	\$ 15,000		
	\$ 1,047,100		
TOTAL CAPITAL PROJECTS	\$ 38,489,809	\$ 427,704	\$ 427,704
CAPITAL FUNDING SOURCES			
	Budget	Received in July	YTD Received
Federal Capital Grants	\$ 9,230,246	\$ -	\$ -
State/Local Capital Grants	\$ 12,940,000	\$ -	\$ -
STA Funding	\$ 1,806,593	\$ 366,708	\$ 366,708
Bus Stop Improvement Reserves	\$ 310,000	\$ -	\$ -
District Reserves	\$ 14,202,970	\$ -	\$ 60,996
TOTAL CAPITAL FUNDING	\$ 38,489,809	\$ 366,708	\$ 427,704

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**SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
NOTES TO REVENUE AND EXPENSE REPORT**

1. Passenger fares (farebox and pass sales) are \$29,371 or 9.7% under the final budget amount for the year to date. Paratransit fares are \$920 or 4.8% over the budgeted amount. Special transit fares (contracts) are \$2,519 or 3.8% over the budgeted amount. Highway 17 Express revenue is \$12,541 or 14.4% over the year to date budgeted amount. Together, all four passenger revenue accounts are under the budgeted amount for the first month of the fiscal year by a net \$13,391 or 2.8%.
2. Advertising income is \$16,725 over the budgeted amount for the first month of the year based on current advertising levels on the exterior of District buses. A formal program to sell ads has not yet been implemented, but the Assistant General Manager is preparing advertising contracts for interested vendors.
3. Rent income is \$ 1,397 over budget for the first month of the year due to two payments by one tenant.
4. Interest income is \$27,312 over budget for the first month of the year due to higher interest rates than projected in the County investment pool.
5. Non-transportation revenue is \$56,728 over budget for the first month of the year due to the quarterly reimbursement by the County for the employee share of the CalPERS retirement expense.
6. Sales tax income is \$ 30,800 under budget because the first advance payment did not meet the projected amount.
7. Personnel expense in several departments is over budget since the August medical premium payment to CalPERS was included in the July reporting period.
8. Administration non-personnel expense is at 12.5% of the budget due to the annual payment of APTA dues.
9. Human Resources non-personnel expense is at 16.4% of the budget due to arbitration costs.
10. Information Technology non-personnel expense is at 11.4% of the budget due to volume purchase of supplies for the computer system.
11. District Counsel non-personnel expense is at 8.8% of the budget due to payment for legal services.
12. Workers' comp expense is at 10.0% of the budget due to payment of annual fees in July.
13. Absence with pay is at 10.0% of the budget since more vacation time is taken in the summer months. Total payroll is within budget.

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14. Temp help expense is at 100.0% of the budget since budget transfers have not yet been processed for some departments using temp help during position vacancies. Temp help is only funded through budget transfers from the salary account.
15. Outside repair of buildings and equipment is at 9.9% of the budget due to repairs of a ventilation system.
16. Outside repair of vehicles is at 12.4% of the budget due to necessary repair of revenue and non-revenue vehicles for both Fleet Maintenance and ParaCruz.
17. Paratransit contract transportation expense is at 9.3% of the budget because two monthly payments are reflected in the report.
18. Revenue vehicle parts expense is at 19.3% of the budget because parts are purchased as needed and the cost fluctuates from month to month.
19. Office/computer supplies are at 7.2% of the budget due to volume purchase of IT supplies.
20. Repair/maintenance supplies are at 9.2% of the budget due to required equipment maintenance.
21. Repairs to property is a casualty and liability account to which repairs to District vehicles and property are charged when another party is liable for the damage. All collections made from other parties for property repair are applied to this account to offset the District's repair costs.
22. Taxes are at 9.4% of the budget due to payment of the Metro Center parking taxes.
23. Dues and subscriptions are at 67.3% of the budget due to annual payment of APTA dues.
24. Leases and rentals are at 9.5% of the budget primarily due to the annual payment to Greyhound for Metro Center parking.

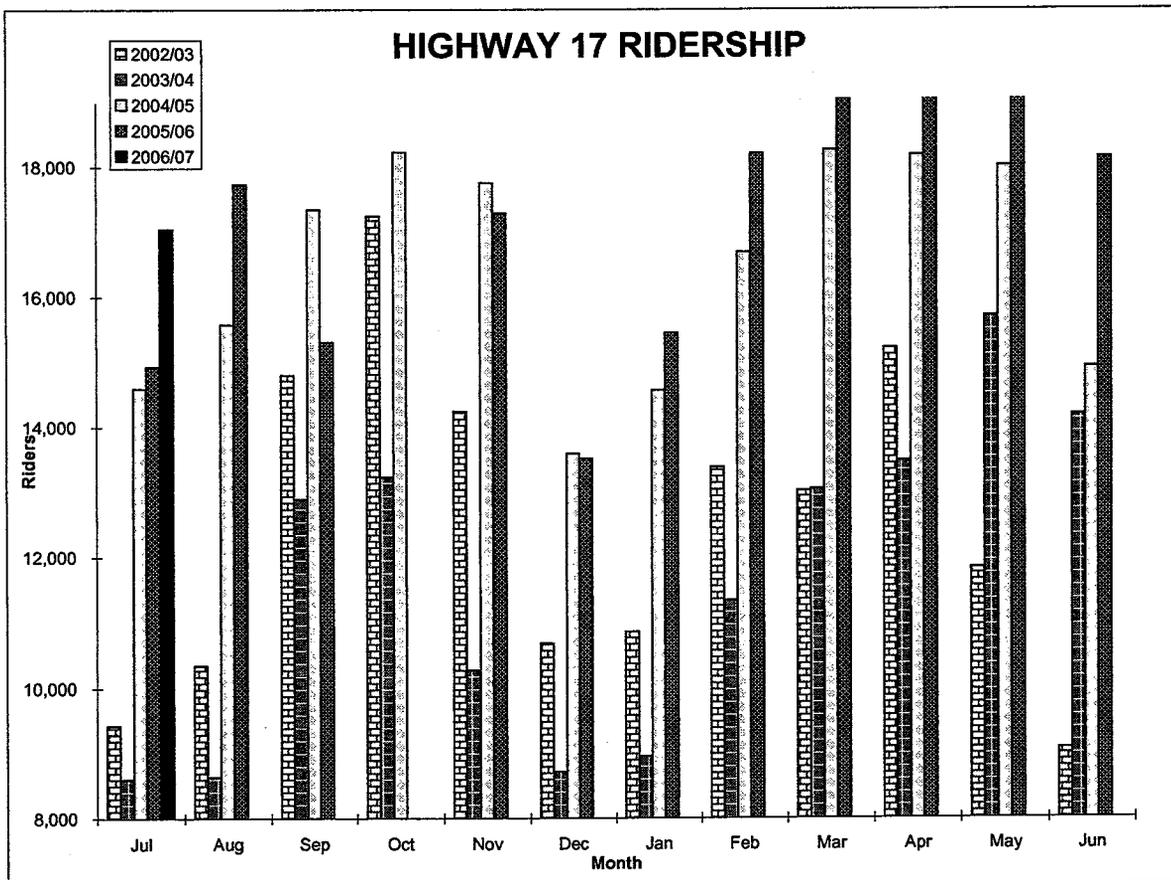
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**FY 06-07 BUDGET TRANSFERS
AUGUST 1-31, 2006**

	ACCOUNT #	ACCOUNT TITLE	AMOUNT
TRANSFER # 07-001			
TRANSFER FROM:	503033-1700	Legal Services	\$ (100)
TRANSFER TO:	503031-1700	Prof/Tech Services & Fees	\$ 100
REASON:	To cover account over-run in the Legal Department.		
TRANSFER # 07-002			
TRANSFER FROM:	503033-1700	Legal Services	\$ (1,000)
TRANSFER TO:	503031-1700	Prof/Tech Services & Fees	\$ 1,000
REASON:	To cover account over-run in the Legal Department.		

HIGHWAY 17 - JULY 2006

	JULY			YTD		
	This Year	Last Year	%	This Year	Last Year	%
FINANCIAL						
Cost	\$ 129,435	\$ 111,020	16.6%	\$ 129,435	\$ 111,020	16.6%
Farebox	\$ 57,506	\$ 47,775	20.4%	\$ 57,506	\$ 47,775	20.4%
Operating Deficit	\$ 64,304	\$ 54,723	17.5%	\$ 64,304	\$ 54,723	17.5%
Santa Clara Subsidy	\$ 32,152	\$ 27,361	17.5%	\$ 32,152	\$ 27,361	17.5%
METRO Subsidy	\$ 32,152	\$ 27,361	17.5%	\$ 32,152	\$ 27,361	17.5%
San Jose State Subsidy	\$ -	\$ -		\$ -	\$ -	
AMTRAK Subsidy	\$ 7,625	\$ 8,523	(10.5%)	\$ 7,625	\$ 8,523	(10.5%)
STATISTICS						
Passengers	17,050	14,922	14.3%	17,050	14,922	14.3%
Revenue Miles	40,199	40,199	0.0%	40,199	40,199	0.0%
Revenue Hours	1,508	1,508	0.0%	1,508	1,508	0.0%
Passengers/Day	550	481	14.3%	550	481	14.3%
Passengers/Weekday	698	613	13.9%	698	613	13.9%
Passengers/Weekend	280	241	16.1%	280	241	16.1%
PRODUCTIVITY						
Cost/Passenger	\$ 7.59	\$ 7.44	2.0%	\$ 7.59	\$ 7.44	2.0%
Revenue/Passenger	\$ 3.37	\$ 3.20	5.3%	\$ 3.37	\$ 3.20	5.3%
Subsidy/Passenger	\$ 3.77	\$ 3.67	2.8%	\$ 3.77	\$ 3.67	2.8%
Passengers/Mile	0.42	0.37	14.3%	0.42	0.37	14.3%
Passengers/Hour	11.31	9.89	14.3%	11.31	9.89	14.3%
Recovery Ratio	44.4%	43.0%	3.2%	44.4%	43.0%	3.2%



SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Steve Paulson, Paratransit Administrator
SUBJECT: METRO PARACRUZ OPERATIONS STATUS REPORT

I. RECOMMENDED ACTION

This report is for information only- no action requested

II. SUMMARY OF ISSUES

- METRO ParaCruz is the federally mandated ADA complementary paratransit program of the Transit District, providing shared ride, door-to-door demand-response transportation to customers certified as having disabilities that prevent them from independently using the fixed route bus.
- METRO assumed direct operation of paratransit services November 1, 2004.
- New regulations regarding lunch and rest breaks became effective August 1, 2005.
- Operating Statistics and customer feedback information reported are for the month of July 2006.

III. DISCUSSION

METRO ParaCruz is the federally mandated ADA complementary paratransit program of the Transit District, providing shared ride, door-to-door demand-response transportation to customers certified as having disabilities that prevent them from independently using the fixed route bus.

METRO began direct operation of ADA paratransit service (METRO ParaCruz) beginning November 1, 2004. This service had been delivered under contract since 1992.

New regulations requiring meal periods became effective August 1, 2005. This presented new scheduling challenges resulting in decreased driver productivity and increased use of supplemental service providers.

During the month of July, ten (10) service complaints and three (3) compliments were received. Two (2) of the complaints was found to be "not valid". Five (5) of the valid complaints was related to vehicles running late. Three (3) complaints were related to driver attitude. One (1) complaint was related to office staff. A module related to customer service and handling of

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challenging customers is being incorporated into the next cycle of staff training in response to this type of feedback.

Comparative Operating Statistics for July 2005 and July 2006

	July 05	July 06
Requested	7570	7311
Performed	6513	6683
Cancels	19.55%	18.59%
No Shows	4.15%	2.28%
Total miles	50,755	47,981
Av trip miles	5.86	5.16
Within ready window	91.97%	90.56%
Excessively late/missed trips	9	13
Monthly call volume	6163	5838
Call average seconds to answer	36	24
Hold times less than 2 minutes	88%	95%
Distinct riders	795	795
Most frequent rider	52 rides	54 rides
Shared rides	58.5%	67.3%
Passengers per rev hour	1.68	1.62
Rides by supplemental providers	5.47%	5.97%
SCT cost per ride	\$22.23	\$22.14
ParaCruz driver cost per ride (estimated)	\$23.58	\$24.27
Rides < 10 miles	81.29%	81.40%
Rides > 10	18.71%	18.60%

IV. FINANCIAL CONSIDERATIONS

NONE

V. ATTACHMENTS

NONE

5-8.2

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006

TO: Board of Directors

FROM: Mark J. Dorfman, Assistant General Manager

SUBJECT: UNIVERSITY OF CALIFORNIA – SANTA CRUZ SERVICE UPDATE

I. RECOMMENDED ACTION

This report is for information purposes only. No action is required

II. SUMMARY OF ISSUES

- Student trips for August 2006 increased by 22.1% versus August 2005.
- Faculty / staff trips for August 2006 decreased by (2.9%) versus August 2005.
- Revenue received from UCSC for August 2006 was \$54,014 versus \$45,690 for August 2005, an increase of 18.2%.

August	Total Student Ridership	Total Faculty/Staff Ridership	Average Ridership <i>Per Weekday</i> – Faculty / Staff
2006	36,030	21,249	843.2
2005	29,517	21,878	862.9
Monthly Increase-(Decrease)	22.1%	(2.9%)	(2.3%)

III. DISCUSSION

UCSC Spring instruction ended on June 15th, 2006. UCSC Fall instruction began on September 21, 2006. A summary of the results for August 2006 is:

- Student billable trips for August 2006 were 36,030 vs. 29,517 for August 2005, an increase of 22.1%.
- Faculty / Staff billable trips for August 2006 were 21,249 vs. 21,878 for August 2005, a decrease of (2.9%).
- Average Faculty / Staff billable trips *per weekday* for August 2006 were 843.2 vs. 862.9 for August 2005, a decrease of (2.3%).

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IV. FINANCIAL CONSIDERATIONS

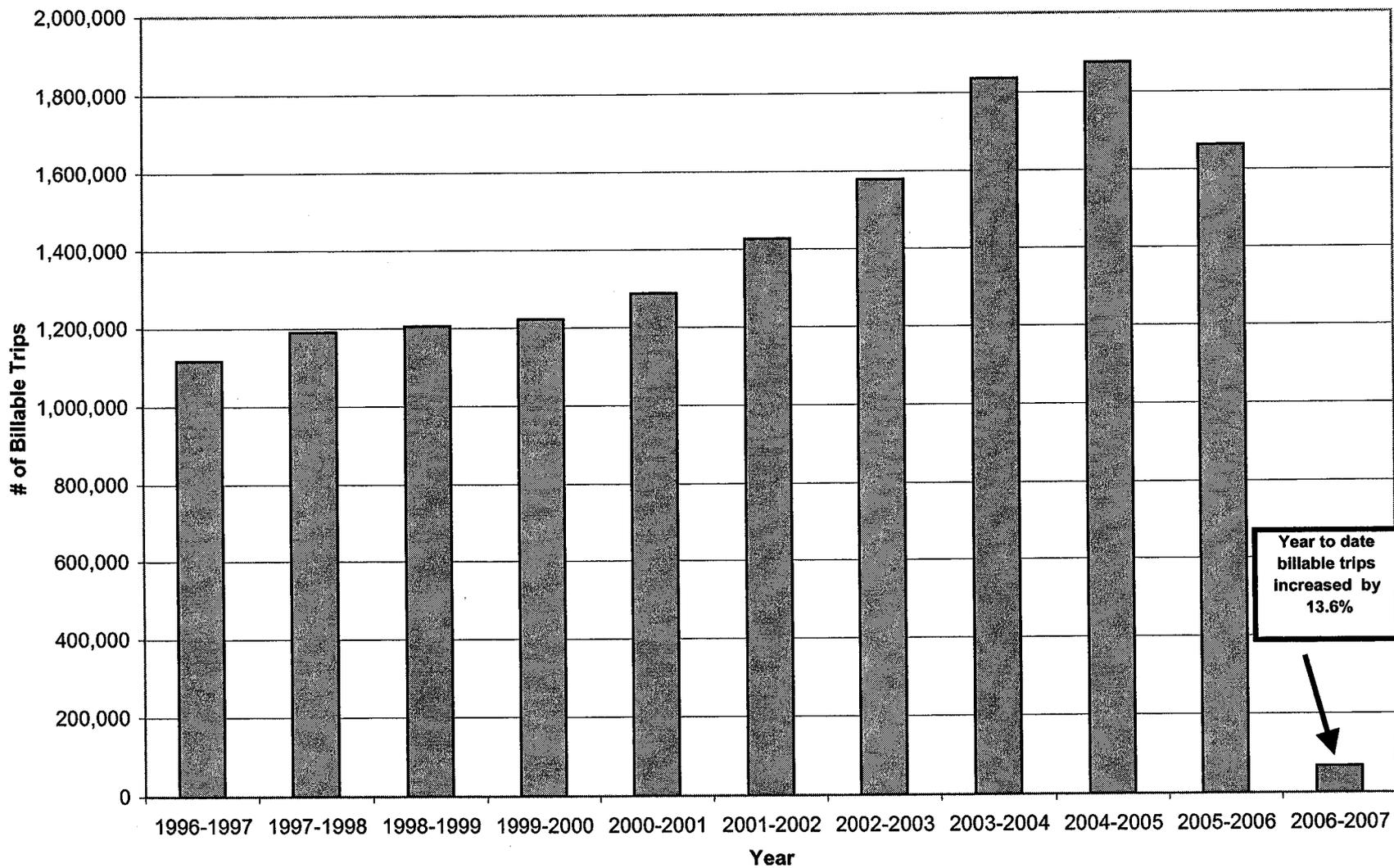
NONE

V. ATTACHMENTS

Attachment A: UC Student Billable Trips

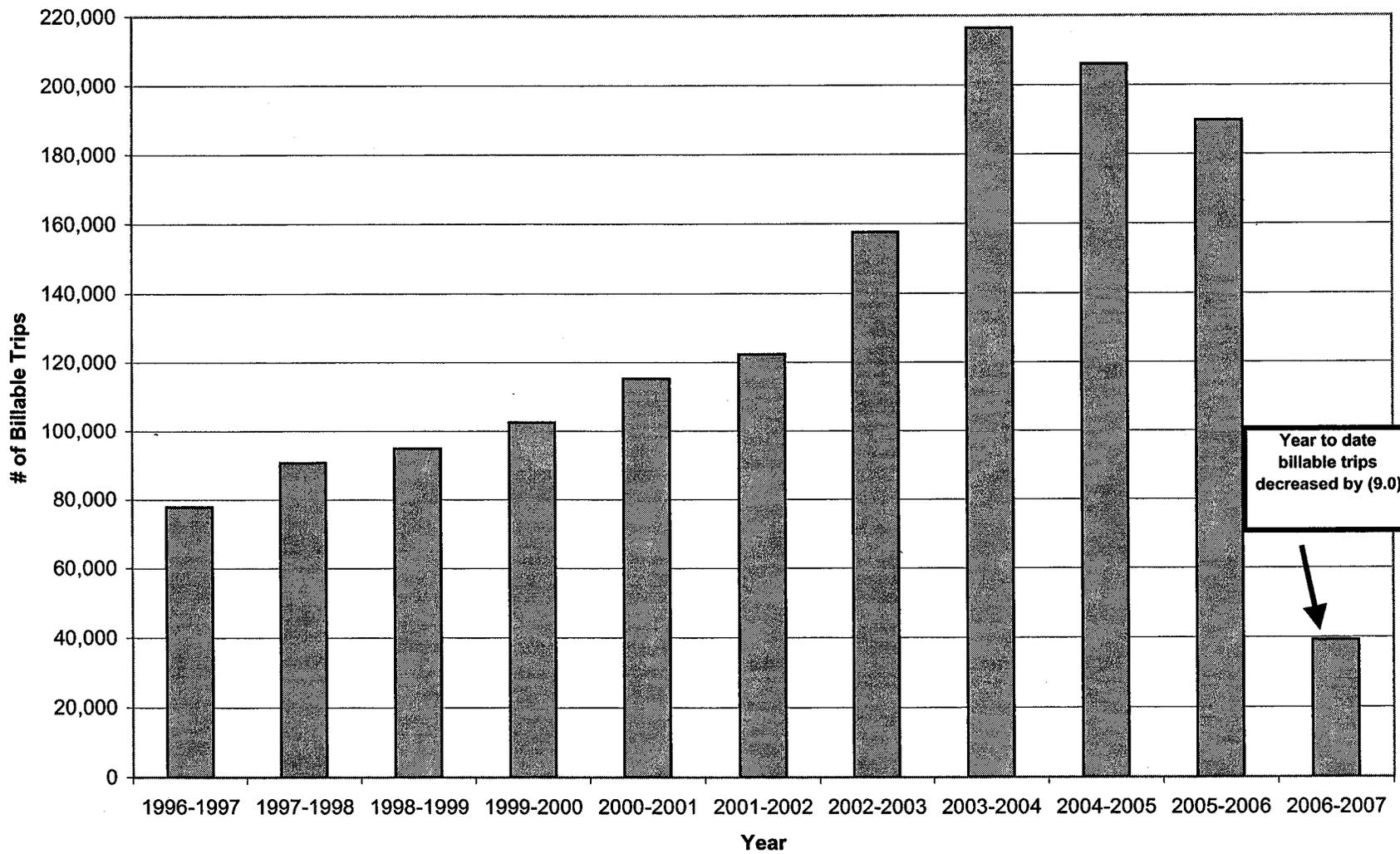
Attachment B: UCSC Faculty / Staff Billable Trips

UCSC Student Billable Trips



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UCSC Faculty / Staff Billable Trips



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Attachment B

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Frank L. Cheng, Project Manager
SUBJECT: STATUS OF THE METROBASE

I. RECOMMENDED ACTION

That the Board of Directors accept and file the MetroBase Status Report.

II. SUMMARY OF ISSUES

- Service Building work
 - Pouring and curing concrete for floor foundation, and columns.
 - Received DFG Agreement and work on outfall construction under way.
 - Change Order #1 explanation on charges incurred for the work.
 - Caltrans Encroachment Permit process near completion for approval.
- Maintenance Building
 - On October 2, 2006, Final Addendum issued.
 - On October 17, 2006, Invitation For Bid for the Maintenance Building due at 2:00 pm PST at 110 Vernon Street, Suite B, Santa Cruz, CA.

III. DISCUSSION

Service & Fueling Building work is continuing on 1122 River Street. Concrete work for foundation floor and flooring for facility has been completed. Further pouring is occurring for the columns and walls of the building.

On September 15, 2006, METRO received Department of Fish & Game (DFG) executed agreement with the understanding that work would commence immediately upon receipt of agreement. On October 2, 2006, Arntz Builders commenced work on outfall structure. Completion date is October 15, 2006 per DFG agreement.

On June 23, 2006, Arntz Change Order #1 was brought to the Board of Directors for confirmation. The change order was for an increase of \$821.69 for catch basin work to be consistent with those specified by Caltrans rather than City of Santa Cruz. The Board request information regarding whether RNL should be responsible for the cost of this change. Upon investigation, this issue still found that the additional cost was for materials and work that would have been done in the original contract had the Caltrans catch basin been specified. Therefore, staff recommends that METRO assume the cost for this change.

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On March 13, 2006, State of California Department of Transportation(Caltrans) issued Potholing permit, one of two permits applied for by METRO/Arntz Builders. The second permit is an encroachment permit for work on Highway 9 to connect to water storm drain and other utilities. During the application, METRO was ask to provide Right of Way(ROW) information and apply it to the drawings. After contracting with a surveyor and contacting Caltrans ROW department, METRO found that the property across the street 1122 River Street, Santa Cruz, CA has some issues in regard to legal descriptions. This property is from the City of Santa Cruz Corporation Yard(Corp Yard). Corp Yard property is a combination of four properties which were not properly filed. Therefore, there is not a combined parcel legal description for this property. Due to the lack of ROW information and undetermined time to attain resolution to the issue, Caltrans allowed METRO to submit drawings with reference points to METRO property lines. METRO has informed Caltrans that the encroachment permit is crucial due to the fact that existing storm drain that went through 1122 River Street site was corroded away. As a result, METRO has installed new storm drains on the property but is unable to connect to the storm drain under Highway 9 without the encroachment permit. The urgency comes from the fact that is getting close and once the rains begin, water that runs through that storm drain will have nowhere to go and will flood the streets. Caltrans is currently reviewing the plans. Once METRO receives the encroachment permit, Arntz Builders can continue with the storm drain and utility connections.

On August 8, 2006, Notice for Bid 06-01 MetroBase Maintenance Building and Related Site Work was sent out to all interested bidders and Builders Exchanges. On August 22, 2006, Invitation For Bid became available at Watsonville Blueprint. Pre-Bid Conference was held on September 6, 2006 at 110 Vernon Street, Suite B, Santa Cruz, CA. IFB 06-01 Bid due on October 17, 2006 at 2:00 pm. Consideration of award of contract for IFB 06-01 is scheduled for consideration on October 27, 2006 Board of Directors meeting.

New updates for the MetroBase Project can be viewed at <http://www.scmtd.com/metrobase> Information on the project, contact information, and MetroBase Hotline number (831) 621-9568 can be viewed on the website.

New updates on the MetroBase Project:

- Caltrans Encroachment Permit process near completing for approval
- Change Order #1 explanation on charges incurred for the work
- Pouring and curing concrete for floor foundation, and columns
- Final Addendum released on October 2, 2006
- IFB 06-01 Maintenance Building due October 17, 2006 at 2:00pm

Previous information regarding the MetroBase Project:

- A. Service & Fueling Building (IFB 05-12)
- Continuing Department of Fish&Game approved work on outfall construction.

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- Concrete work for floor foundation area complete.
- Concrete work for LNG pad and containment area completed.
- Change Order #2 and #3 approved.
- Concrete Driven Piles completed end of May 2006.
- Arntz Builders trailer and containers installed adjacent to 1122 River Street
- Public Outreach Newsletter sent to areas possibly affected by construction.
- Notice to Proceed issue effective January 9, 2006 with 365 calendar day construction period.
- Weekly Construction Meetings

B. Maintenance Building (IFB 06-01)

- Invitation For Bid 06-01 available at Watsonville BluePrint. Pre-Bid Conference scheduled for September 6, 2006 at 110 Vernon Street, Suite B, Santa Cruz, CA. IFB 06-01 Bid due on October 17, 2006 at 2:00 pm.
- Construction schedule set to 32 months
- RNL contract modified for added Maintenance Building scope
- RNL began working on the Maintenance Building portion of the MetroBase project.
- Harris & Associates contract modified for added Maintenance Building scope.

IV. FINANCIAL CONSIDERATIONS

Funds for the construction of the Service & Fueling Building Component of the MetroBase Project including the Change Orders referenced in this staff report are available within the funds the METRO has secured for the Project.

V. ATTACHMENTS

None

5-11.3

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Tom Stickel, Manager of Fleet Maintenance
**SUBJECT: CONSIDERATION OF CONTRACT RENEWAL FOR LONG TERM
DISABILITY INSURANCE WITH ALLIANT INSURANCE SERVICES**

I. RECOMMENDED ACTION

District Staff recommends that the Board of Directors authorize the General Manager to execute an amendment to the contract for Long Term Disability Insurance with Alliant Insurance Services to extend the contract for one additional year.

II. SUMMARY OF ISSUES

- The District has a contract with Alliant Insurance Services, Inc. (formerly Driver Alliant Insurance Services, Inc.) for Long Term Disability Insurance Coverage.
- At the option of the District, this contract may be renewed for four (4) additional one-year terms.
- Alliant Insurance Services, Inc. has indicated that they are interested in extending the contract.
- It is recommended that the Board of Directors authorize the General Manager to execute an amendment to the contract with Alliant Insurance Services, Inc. to extend the contract for one additional year to provide long term disability insurance coverage.

III. DISCUSSION

The District provides long-term disability insurance for its employees. The benefit provides for income continuation during absences due to disability. The current District contract will expire at the end of December 2006. An extension of the contract would be favorable to the District. The contract allows the District the option to renew the contract for three (3) additional one-year terms. Contractor has also reviewed the contract and has indicated their desire to extend the contract with a rate increase of less than 10% for the new contract period.

It is recommended that the Board of Directors authorize the General Manager to execute an amendment to the contract with Alliant Insurance Services, Inc. to extend the contract for one additional year for long term disability insurance.

5-12.1

IV. FINANCIAL CONSIDERATIONS

Adequate funds are available in the current year budget for this contract.

V. ATTACHMENTS

Attachment A: Contract Amendment with Alliant Insurance Services

**SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
FIRST AMENDMENT TO CONTRACT NO. 04-09
FOR LONG TERM DISABILITY INSURANCE**

This First Amendment to Contract No. 04-09 for Long Term Disability Insurance is made effective January 1, 2007 between the Santa Cruz Metropolitan Transit District, a political subdivision of the State of California ("District") and Alliant Insurance Services, Inc. formerly Driver Alliant Insurance Services, Inc. ("Contractor").

I. RECITALS

- 1.1 District and Contractor entered into a Contract for Long Term Disability Insurance ("Contract") on January 1, 2005.
- 1.2 The Contract allows for the extension upon mutual written consent.
- 1.3 Contractor has requested an increase in the rate of compensation.

Therefore, District and Contractor amend the Contract as follows:

II. TERM

- 2.1 Article 3.02 is amended to include the following language:

This contract shall continue through December 31, 2007. This Contract may be mutually extended by agreement of both parties.

III. COMPENSATION

- 3.1 Effective January 1, 2007, District shall compensate Contractor at a rate of \$1.13 per \$100 covered payroll per month for Management, Administrative, and Maintenance employees (Class 1) and \$1.54 per \$100 covered payroll per month for Bus Operators (Class 3).

IV. REMAINING TERMS AND CONDITIONS

- 4.1 All other provisions of the Contract that are not affected by this amendment shall remain unchanged and in full force and effect.

V. AUTHORITY

- 5.1 Each party has full power to enter into and perform this First Amendment to the Contract and the person signing this First Amendment on behalf of each has been properly authorized and empowered to enter into it. Each party further acknowledges

that it has read this First Amendment to the Contract, understands it, and agrees to be bound by it.

Signed on _____

DISTRICT
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Leslie R. White
General Manager

CONTRACTOR
ALLIANT INSURANCE SERVICES, INC.

By _____

Christine Kerns
Vice President

APPROVED AS TO FORM:

Margaret R. Gallagher
District Counsel

5-12.a²

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

STAFF REPORT

DATE: October 27, 2006
TO: Board of Directors
FROM: Margaret Gallagher, District Counsel
SUBJECT: ACCEPT AND FILE CALL STOP AUDIT REPORT FOR THE PERIOD OF APRIL THROUGH JUNE 2006

I. RECOMMENDED ACTION

This report is for informational purposes only. No action is required.

II. SUMMARY OF ISSUES

- At the November 2001 Board of Directors meeting, staff was authorized to conduct quarterly call stop compliance audits of the internal call stop announcements.
- Staff contracted with Robert S. Bortnick & Associates, a private investigative firm, to conduct the audit.
- METRO has 41 active routes serving 998 active bus stops. On July 25, 2003, the Talking Bus was activated on all local routes excluding the Highway 17 service.
- On February 23, 2004 all buses and routes, including the Highway 17 service were equipped with the Talking Bus Technology and the system was fully operational.

III. DISCUSSION

At the November 2001, Board of Directors' meeting, staff was authorized to conduct quarterly call stop compliance audits to insure that call stop announcements were being made. Staff contracted with Robert S. Bortnick & Associates, a private investigative firm, to conduct the audits. Robert S. Bortnick & Associates was authorized to conduct 100 hours to survey the internal announcements at a cost of \$5,000.00 each quarter. METRO has 41 active routes serving 998 active bus stops. METRO purchased Talking Bus equipment and programming capabilities in order to assure compliance with the call stop requirements. On July 25, 2003 the Talking Bus was activated on all local routes. On February 23, 2004, all buses in Metro's fixed route service, including the Highway 17 service, were equipped with the Talking Bus Technology.

Attachment A details the results of the current audit for the period July through September 2006. The results of the audit indicate a compliance rate of 98.3%. Attachment B provides the results of the call stop audits since the Talking Bus Technology has been in operation.

All compliance issues are referred to the Operations Department for review and appropriate action. Equipment malfunctions are referred to the Maintenance Department and programming errors are referred to the IT Department.

At the July 2006 Board meeting when the preceding report was reviewed, METRO staff was asked to highlight the missed call stops that are due to mechanical failures. However, METRO staff is unable to distinguish between mechanical failures and other types of failures i.e. programming, system, etc.

Additionally, METRO's contract security guards complete random external route announcement checks on 25 buses per day at Pacific Station, verifying that each bus announces the route four times within a 2-minute period prior to the bus' departure from Pacific Station. During this period, July through September 2006, the security guards documented that of the buses that they audited daily for the 90-day period, only 11 failures occurred during the period. Therefore, of the 2,250 possible external announcements, the announcements were properly announced 2,239 times (99.5%) and failed 11 times (0.5%) during the period.

IV. FINANCIAL CONSIDERATIONS

Randomly conducted call stop compliance audits cost approximately \$20,000.00 per year.

V. ATTACHMENTS

Attachment A: Stop Announcement Audit Results (July-September 2006)

Attachment B: Summary of Audit Results

5-13.2

ROBERT S. BORTNICK & ASSOCIATES
PRIVATE INVESTIGATION

CRIMINAL/CIVIL
CA. LIC. NO. P111733

136 VERNON STREET
SANTA CRUZ, CALIFORNIA 95060
TELEPHONE (831) 423-5122
FAX (831) 459-0430
E-MAIL: BortnickPI@yahoo.com

STOP ANNOUNCEMENT AUDIT RESULTS (JULY – SEPTEMBER 2006)

Statistical Summary

Total number of trips surveyed _____ 83

Total number of trips with talking buses _____ 83 (100%)

Total number of stop announcements surveyed _____ 2,535

Total number of stop announcements made _____ 2,491 (98%)

Total number of stop announcements missed _____ 44

Key to Codes

E = external announcement not working
M = missed stop announcement(s)

Operator Badge Issues

- *1 – Fit, tall, Caucasian male, 40-ish, grey hair, no facial hair
- *2 – Older Caucasian male, grey hair, medium height
- *3 – Did not note the Badge ID# or description of operator on this trip

Table of Results

<u>ROUTE</u>	<u>OP #</u>	<u>BUS #</u>	<u>DATE</u>	<u>CALLS</u>		<u>NOTES</u>
				<u>MADE</u>	<u>MISSED</u>	
03 – Mission & Nat Brdgs		2201	09/19/06	0	11	E, M
03 – Mission & Nat Brdgs		2230	09/25/06	38	1	M
04 – Harvey Wst/Par/Em		8085	09/19/06	21	0	
07 – Beach/Lighthouse		9809	09/29/06	27	0	
10 – UC High St		9809	09/10/06	21	0	
10 – UC High St		2204	10/01/06	32	0	

Table of Results

<u>ROUTE</u>	<u>OP #</u>	<u>BUS #</u>	<u>DATE</u>	<u>CALLS MADE</u>	<u>CALLS MISSED</u>	<u>NOTES</u>
13 – UC Walnut		9832	09/28/06	35	0	
13 – UC Walnut		9839	09/29/06	35	0	
15 – Laurel West		9831	09/25/06	13	0	
15 – Laurel West		2225	09/25/06	16	0	
16 – Laurel East		2207	09/08/06	31	0	
16 – Laurel East		9801	09/10/06	11	0	
19 – Lower Bay Wkend		2222	09/24/06	41	0	
19 – Lower Bay Wkend		2232	10/01/06	37	4	M
19 – UC Lower Bay		9811	09/11/06	34	0	
19 – UC Lower Bay		2226	09/27/06	38	0	
20 – UC Westside		9811	09/08/06	49	0	
31 – S Vly Dr/Grm Hill		2207	09/28/06	21	0	
31 – S Vly Dr/Hwy 17 SC		2207	09/28/06	20	1	M
36 – Glen Arbor/Mt Str		2213	09/27/06	38	0	
35 – Santa Cruz		9819	09/09/06	36	0	
35 – Santa Cruz		Missed	09/21/06	22	0	
35 – Santa Cruz		2213	09/21/06	36	0	
35 – Santa Cruz		2201	09/23/06	36	0	
35 – Santa Cruz		2210	09/24/06	32	0	
35 – Santa Cruz		2214	09/25/06	32	0	
35 – Santa Cruz		9813	09/27/06	36	0	
35A – Glen Arbor/Mt Str		2213	09/23/06	47	0	
35A – Glen Arbor/Mt Str CC		2211	09/21/06	45	2	M
35A – Hwy 9/Bear Creek		2228	09/21/06	30	2	M
35A – Hwy 9/CC		9806	09/09/06	19	0	
35A – Hwy 9/CC		9819	09/09/06	21	0	
35A – Hwy 9/CC		2213	09/25/06	40	0	
35A – Hwy 9/Mt Str/Sylvn		2222	09/24/06	40	0	
40 – Davenport		2227	08/15/06	15	0	
40 – Santa Cruz		2227	08/15/06	14	0	
42 – Davenport/Bonny Dn		2223	09/24/06	46	0	
42 – Davenport/Bonny Dn		2223	10/01/06	43	0	
53 – Capitola/Dominican		2217	09/29/06	11	0	
54 – Aptos/LSB		2219	08/12/06	55	2	M
54 – Capitola Mall		2222	08/12/06	45	0	
55 – Rio Del Mar		9818	09/26/06	34	0	
55 – Rio Del Mar		9816	09/26/06	21	0	
56 – Cabrillo/La Selva		2219	09/22/06	21	0	
56 – Capitola Mall		9801	09/22/06	10	0	
66 – 17 th Ave/Cap Mall		9822	09/10/06	31	0	
66 – 17 th Ave/Cap Mall		9805	09/22/06	28	1	M
66 – 17 th Ave/Cap Mall		9809	09/23/06	31	0	

Table of Results

<u>ROUTE</u>	<u>OP #</u>	<u>BUS #</u>	<u>DATE</u>	<u>CALLS MADE</u>	<u>CALLS MISSED</u>	<u>NOTES</u>
66 – 17 th Ave/Cap Mall		9805	09/28/06	31	0	
66 – 17 th Ave/SC		2221	08/08/06	6	0	
66 – 17 th Ave/SC		2238	08/08/06	15	0	
66 – 17 th Ave/SC		2215	09/23/06	31	0	
66 – 17 th Ave/SC		2218	09/28/06	31	0	
66 – 17 th Ave/SC2		9809	09/29/06	30	0	
68 to Capitola Mall		2219	08/12/06	31	1	M
68 to Santa Cruz		2215	08/12/06	28	0	
69 – Capitola Rd		9830	09/26/06	20	0	
69 – Capitola Rd		2238	09/29/06	20	0	
69 – Santa Cruz		2229	09/29/06	18	0	
69A – Cap Rd/SC		2226	09/10/06	18	0	
69A – Cap Rd/SC		9815	09/26/06	18	0	
69A – Cap Rd/Wats		2204	08/08/06	33	7	M
69A – Cap Rd/Wats		2213	08/15/06	9	0	
69W – Cabrillo/SC		2222	08/08/06	8	0	
69W – Cabrillo/SC		2228	08/08/06	19	0	
69W – Cabrillo/SC		9808	09/21/06	8	0	
69W – Cabrillo/SC		2231	09/27/06	30	0	
69W – Cabrillo/Wats		2202	09/22/06	19	1	M
70 – Cabrillo		9835	09/11/06	28	0	
70 – Cabrillo		9823	09/26/06	24	0	
70 – Cabrillo		9823	09/27/06	28	0	
70 – Santa Cruz		9825	09/26/06	21	0	
71 – Arthur/Wats		2210	09/29/06	70	0	
71 – Clifford/SC		2205	08/15/06	64	7	M
71 – Clifford/SC		2903	09/11/06	29	0	
71 – Crestview/SC		9830	09/22/06	69	0	
71 – Crestview/Wats		2234	08/15/06	62	0	
71 – Crestview/Wats		9824	09/21/06	8	0	
71 – Pennsylvania/SC		2207	09/29/06	52	2	M
72 – Corralitos		9809	08/08/06	54	0	
74 – Ohlone/Rolling Hills		9808	08/15/06	44	0	
75 – Green Valley		2228	08/08/06	58	2	M
79 – East Lake		2219	09/22/06	22	0	

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SUMMARY OF THE CALL STOP QUARTERLY AUDIT RESULTS

	Oct-Dec 2003	Jan-Mar 2004	Apr-Jun 2004	Jul-Sep 2004	Oct-Dec 2004	Jan-Mar 2005	Apr-Jun 2005	Jul-Sep 2005	Dec 2005- Feb 2006	Apr-Jun 2006	Jul-Sept 2006
Call Stops Surveyed	2,596	2,378	3,223	2,855	2,294	3,521	3,061	2,420	3,297	2,747	2,535
Call Stops Announced	2,558	2,371	3,165	2,842	2,258	3,490	3,003	2,367	3,258	2,693	2,491
Call Stops Not Announced	38	7	58	11	36	31	58	53	39	54	44
Percent of Call Stops Completed	98.5%	99.7%	98.2%	99.6%	98.4%	99.1%	98.1%	97.8%	98.8%	98%	98.3%
% of Call Stops Not Completed	1.5%	.3%	1.8%	.4%	1.6%	.9%	1.9%	2.2%	1.2%	2%	1.7%

5-13.61

Attachment **B**

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

STAFF REPORT

DATE: October 27, 2006
TO: Board of Directors
FROM: Margaret Gallagher, District Counsel
SUBJECT: CONSIDERATION OF 2007 REGULAR BOARD MEETING SCHEDULE

I. RECOMMENDED ACTION

Adopt the attached schedule for the regular meetings of the Board of Directors for 2007.

II. SUMMARY OF ISSUES

- The Santa Cruz Metropolitan Transit District Bylaws set forth the Board of Directors' meeting schedule in a general way stating that the regular meetings shall be on the second and fourth Fridays of the month.
- Attached is a specific schedule of the dates and locations of the Board of Directors' regular meetings for the year 2007.

III. DISCUSSION

The Santa Cruz Metropolitan Transit District Bylaws set forth the Board of Directors' meeting schedule in a general way stating that regular meetings shall be on the second and fourth Fridays of the month. For planning and scheduling purposes, Cindi Thomas, the Administrative Services Coordinator, has prepared a specific schedule detailing the actual dates and locations of the Board of Directors' regular meetings for the year 2007.

The meetings scheduled for the second Friday of the month will be located in the Santa Cruz Metropolitan Transit District's administrative offices and the meetings scheduled for the fourth Friday of the month will usually be held at the Santa Cruz City Council Chambers. However the meeting scheduled for the fourth Friday in May, will take place in Capitola and the meeting scheduled for the third Friday in November, will take place in Watsonville.

It should also be noted that the Board's Bylaws state that if a regular meeting falls within 5 working days of a recognized METRO holiday, i.e. Thanksgiving, Christmas or New Year's Day, the Board of Directors shall reschedule the meeting to a more convenient date. For the year 2007, Thanksgiving falls within 5 days of the fourth Friday in November. Therefore, it is recommended that the second regular Board meeting for November be scheduled on the third Friday of the month rather than the fourth. For the year 2007, Christmas falls within 5 working days of the fourth Friday in December. However, it also falls within 5 working days of the third Friday in December. Even so, it is recommended that the second regular Board meeting for December be scheduled on the third Friday of the month rather than the fourth.

IV. FINANCIAL CONSIDERATIONS

None

V. ATTACHMENTS

Attachment A: Santa Cruz Metropolitan Transit District Board of Directors'
Meeting Schedule - 2007

5-14.2

**SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
BOARD OF DIRECTORS MEETINGS
2nd and 4th Fridays of each month - 2007**

Attachment A

January Meetings

- January 12, 2007 - SCMTD Administrative Offices, 370 Encinal St., Santa Cruz, CA
- January 26, 2007 - Santa Cruz City Council Chambers*

February Meetings

- February 09, 2007 - SCMTD Administrative Offices
- February 23, 2007 - Santa Cruz City Council Chambers*

March Meetings

- March 09, 2007 - SCMTD Administrative Offices
- March 23, 2007 - Santa Cruz City Council Chambers*

April Meetings

- April 13, 2007 - SCMTD Administrative Offices
- April 27, 2007 - Santa Cruz City Council Chambers*

May Meetings

- May 11, 2007 - SCMTD Administrative Offices
- May 25, 2007 - **Capitola City Council Chambers** →

*Capitola City Council
Chambers
420 Capitola Avenue
Capitola, CA*

June Meetings

- June 08, 2007 - SCMTD Administrative Offices
- June 22, 2007 - Santa Cruz City Council Chambers*

July Meetings

- July 13, 2007 - SCMTD Administrative Offices
- July 27, 2007 - Santa Cruz City Council Chambers*

August Meetings

- August 10, 2007 - SCMTD Administrative Offices
- August 24, 2007 - Santa Cruz City Council Chambers*

September Meetings

- September 14, 2007 - SCMTD Administrative Offices
- September 28, 2007 - Santa Cruz City Council Chambers*

October Meetings

- October 12, 2007 - SCMTD Administrative Offices
- October 26, 2007 - Santa Cruz City Council Chambers*

November Meetings

- November 09, 2007 - SCMTD Administrative Offices
- November 16, 2007 - **Watsonville City Council Chambers** →
2nd meeting is scheduled for third Friday due to Thanksgiving Holiday

*Watsonville City
Council Chambers
250 Main St.
Watsonville, CA*

December Meetings

- December 14, 2007 - SCMTD Administrative Offices
- December 21, 2007 - Santa Cruz City Council Chambers*
2nd meeting is scheduled for third Friday due to Christmas Holiday

**NOTE: THE FIRST MEETING OF EACH MONTH IS SCHEDULED FROM 9:00 A.M. - 11:00
THE SECOND MEETING OF EACH MONTH IS SCHEDULED FROM 9:00 A.M. - 12:00 NOON**

5-14.01

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Robyn Slater, Human Resources Manager
SUBJECT: PRESENTATION OF EMPLOYEE LONGEVITY AWARDS

I. RECOMMENDED ACTION

Staff recommends that the Board of Directors recognize the anniversaries of those District employees named on the attached list and that the Board Chair present them with awards.

II. SUMMARY OF ISSUES

- None.

III. DISCUSSION

Many employees have provided dedicated and valuable years to the Santa Cruz Metropolitan Transit District. In order to recognize these employees, anniversary awards are presented at five-year increments beginning with the tenth year. In an effort to accommodate those employees that are to be recognized, they will be invited to attend the Board meetings to receive their awards.

IV. FINANCIAL CONSIDERATIONS

None.

V. ATTACHMENTS

Attachment A: Employee Recognition List

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

EMPLOYEE RECOGNITION

TEN YEARS

None

FIFTEEN YEARS

None

TWENTY YEARS

None

TWENTY-FIVE YEARS

Bruce I. Grobman, Bus Operator

THIRTY YEARS

None

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Mark J. Dorfman, Assistant General Manager
SUBJECT: CONSIDERATION OF AUTHORIZING THE GENERAL MANAGER TO PROVIDE SHUTTLE SERVICE FOR A COUNTY PUBLIC HEALTH PROGRAM ON DECEMBER 9, 2006

I. RECOMMENDED ACTION

Staff recommends that the General Manager be authorized to provide shuttle service for a County of Santa Cruz Public Health Drill/Exercise on December 9, 2006 on a cost reimbursement basis.

II. SUMMARY OF ISSUES

- METRO has received a request from the County Public Health Department for shuttle service to a health drill/exercise in Watsonville on December 9, 2006
- The purpose of this exercise is to administer 1,000 doses of donated FluMist vaccine to school children, school staff, or health care workers
- Part of the exercise is to evaluate how the process works as part of a Pandemic Readiness Program
- METRO has been working with the County on responses to pandemic outbreaks
- The County will reimburse METRO for the cost of the shuttles at the rate of \$68 per hour.

III. DISCUSSION

METRO was contacted by members of the Santa Cruz County Health Department regarding METRO's participation in a Drill/Exercise to be held on December 9, 2006 in Watsonville. The drill will actually dispense 1,000 donated doses of FluMist to school children 5-18 years old, school staff, and healthcare workers. This event is an exercise in pandemic readiness for the community. It will allow healthcare workers to dispense drugs in a surge capacity similar to an anthrax bioterrorism event or a worldwide avian flu occurrence.

All METRO costs incurred in the drill will be reimbursed by the County of Santa Cruz. Staff recommends that METRO be authorized to participate in this health drill / exercise, as METRO needs to be able to respond for incidents such as these.

IV. FINANCIAL CONSIDERATIONS

The service will be provided at the Board adopted shuttle rate of \$68 per hour.

V. ATTACHMENTS

NONE

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006

TO: Board of Directors

FROM: Leslie R. White, General Manager

SUBJECT: CONSIDERATION OF THE APPOINTMENT OF A MEMBER OF THE BOARD OF DIRECTORS TO THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION'S TRANSPORTATION FUNDING TASK FORCE AS A REPLACEMENT FOR DIRECTOR PAT SPENCE.

I. RECOMMENDED ACTION

That the Board of Directors select a Director to serve on the Santa Cruz County Regional Transportation Commission's Transportation Funding Task Force to replace Director Pat Spence.

II. SUMMARY OF ISSUES

- On September 1, 2005 the Santa Cruz County Regional Transportation Commission (SCCRTC) created the Transportation Funding Task Force.
- The membership of the TFTF included a position for a Member of the Board of Directors of the Santa Cruz County Metropolitan Transit District (METRO).
- The METRO Board of Directors appointed Director Pat Spence to serve as a Member of the TFTF.
- In the past year the TFTF has held numerous meetings and work sessions for the Members of the Task Force and the Community.
- On September 15, 2006 Director Pat Spence sent a letter to Board Chair Mike Rotkin indicating that she was resigning from the TFTF.
- In order for METRO to have continued representation on the TFTF it is necessary for the Board to select a replacement Director for Director Pat Spence.

III. DISCUSSION

On September 1, 2005 the Santa Cruz County Regional Transportation Commission (SCCRTC) created the Transportation Funding Task Force. The membership of the TFTF included a position for a Member of the Board of Directors of the Santa Cruz County Metropolitan Transit District (METRO). The METRO Board of Directors appointed Director Pat Spence to serve as a Member of the TFTF. Since the creation of the TFTF numerous meetings and public outreach sessions have been held at various locations throughout Santa Cruz County. Some of the locations selected for the TFTF meetings have presented challenges to individuals with

11.0

disabilities. On September 15, 2006 Director Pat Spence sent a letter to Board Chair Mike Rotkin indicating that she was resigning from the TFTF dues to the uncertainty of meetings being held at accessible locations.

In order for METRO to have continued representation on the TFTF it is necessary for the Board to select a replacement Director for Director Pat Spence.

IV. FINANCIAL CONSIDERATIONS

The selection of a Member of the Board of Directors to serve on the TFTF in place of Director Pat Spence will not have an impact on the 2006/2007 METRO Operating/Capital Budget.

V. ATTACHMENTS

Attachment A: September 15, 2006 Letter from Pat Spence to Mike Rotkin

PAS

September 15, 2006

Mike Rotkin
Chair, Board of Directors
Santa Cruz Metropolitan Transit District

Dear Chair Rotkin,

After assessing past experiences with the five meeting locations, I have determined that I must resign as METRO's Board representative to the Transportation Funding Task Force.

This decision is not based on a lack of desire to participate or the need for improved transportation in Santa Cruz County, but in concern to safely function within the limits of my disability without fully accessible code compliant features of the meeting facilities.

Sincerely,

Patricia A. Spence

cc: Les White, Metro GM
Fred Keeley, TTF convener
SCCRTC c/o George Dondero, Executive Director
Karen Pushnik
Ellen Pirie, Commission Chair

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006

TO: Board of Directors

FROM: Leslie R. White, General Manager

SUBJECT: CONSIDERATION OF AWARD OF CONTRACT FOR CONSTRUCTION OF THE METROBASE VEHICLE MAINTENANCE BUILDING AND APPROVAL OF CONTRACT CHANGE ORDER PROCEDURES

I. RECOMMENDED ACTION

District Staff recommends that the Board of Directors authorize the General Manager to execute a contract for construction of the MetroBase Vehicle Maintenance Building with West Bay Builders, Inc. and to approve contract change order procedures.

II. SUMMARY OF ISSUES

- A competitive procurement was conducted to solicit bids from qualified firms.
- Two firms submitted bids for the District's review.
- District staff has reviewed all submitted bids.
- District staff is recommending that a contract be established with West Bay Builders, Inc. to provide construction of the MetroBase Vehicle Maintenance Building.
- District staff is recommending that the Board of Directors approve contract change order procedures as provided in this report.

III. DISCUSSION

The District has a need to construct a new vehicle maintenance facility and perform related site work at the District's Minor Maintenance yard on Golf Club Drive. The project consists of construction of a building for major and minor bus maintenance, supporting site grading, paving, sidewalk and driveway extensions.

On August 22, 2006, a notice of Invitation for Bid No. 06-01 was mailed to eighty-four firms and was legally advertised. The IFB was legally advertised and published in two online construction bid web sites that service the construction community. On October 17, 2006, bids were received and opened from two firms. A list of firms and a summary of the bids received are provided in Attachment A. District staff has reviewed all submitted bids.

District staff is recommending that a contract be established with West Bay Builders, Inc. to provide construction of MetroBase Vehicle Maintenance Building for an amount not to exceed \$15,195,000. Contractor will provide all equipment and materials meeting all District specifications and requirements.

12.1

Funds in the amount of \$15,550,000 (Engineer's Estimate for this project) shall be set aside for payments made on this contract. The difference from the Engineer's Estimate and the Contractor's bid of \$15,195,000 shall be used for change orders against this contract. If additional funding is required, District staff will return to the Board of Directors for approval.

District staff is recommending that the Board of Directors approve the following construction contract change order procedures that will apply to this construction contract:

1. For any change order request from the contractor that exceeds \$50,000, District staff will review and present such request to the District's Board of Directors for approval.
2. For any change order request from the contractor that is \$50,000 or less, approval of the change order will require review and approval from the following three personnel:
District's Construction Manager (Harris and Associates);
District's Project Manager Frank Cheng; and
Either the District's General Manager or the Assistant General Manager.
3. District staff shall report every month to the Board of Directors on all change orders processed for this contract.

IV. FINANCIAL CONSIDERATIONS

Funding for this contract is contained in MetroBase Capital Construction Funds.

V. ATTACHMENTS

Attachment A: IFB No. 06-01 Bid Results

Attachment B: Contract with West Bay Builders, Inc.

Note: The RFP (or IFB) along with its Exhibits and any Addendum(s) are available for review at the Administration Office of METRO or online at www.scmttd.com

IFB No. 06-01 MetroBase Maintenance Building and Related Site Work Bid Results

Company Name	West Bay Builders, Inc. Novato, CA	Arntz Builders, Inc. Novato, CA
Bid Price	\$15,195,000.00	\$15,388,600.00
Acknowledges Addenda No. 1 & 2	Yes	Yes
Bidder will perform a minimum of ___% of the total of all work with its forces	40%	15%
Bidder's Bond Amount	10%	10%
Subcontractor's List	Subcontractor's List	Subcontractor's List
Demo/Earthwork	Calhoun Bros, Santa Clara	Calhoun Bros, Santa Clara
Utilities	Jake Shumaker, Sunnyvale	Jake Shumaker, Sunnyvale
Site Concrete	Escobar & Escobar	Whiteside Concrete, Richmond
Landscape	Quality Landscape, Watsonville	Quality Landscape, Watsonville
Rebar	Titan, Sacramento	Titan, Sacramento
Masonry	Bratton Masonry, Fresno	Bratton Masonry, Fresno
Steel/Misc. Metals	Concord Iron Works, Concord	Olson & Company, San Leandro
Metal Deck	BT Mancini, Milpitas	BT Mancini, Milpitas
Insulation	F. Rogers, Livermore	Coast Building Products, San Jose
Roofing	Louis & Riparetti, Scotts Valley	Louis & Riparetti, Scotts Valley
Overhead Doors	Coast Counties Glass, Monterey	Coast Counties Glass, Monterey
Window/Glazed Wall Assemblies	Coast Counties Glass, Monterey	Coast Counties Glass, Monterey
Drywall	Pace Drywall, Concord	North Bay Drywall, Petaluma
Painting	A&B Painting, Santa Clara	N.J. Kann, San Jose
Fire Protection	Marque Fire Protection, Sacramento	Larry Williams & Sons, Novato
Plumbing	O.C. MacDonald, San Jose	George H. Wilson, Santa Cruz
HVAC	O.C. MacDonald, San Jose	George H. Wilson, Santa Cruz
Electrical	J.M. Electric, Salinas	J.M. Electric, Salinas
Vehicle Lifts	Peterson Hydraulics, Gardena	Peterson Hydraulics, Gardena
Shop Equipment	Peterson Hydraulics, Gardena	
Aluminum Overhead Doors	N. Bay Overhead, San Rafael	
Sound Barrier Walls		Bratton Masonry, Fresno

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Attachment A

CONTRACT FOR CONSTRUCTION OF METROBASE VEHICLE MAINTENANCE BUILDING AND RELATED SITE WORK No. 06-01

THIS CONTRACT is made effective on _____, 2006 between the SANTA CRUZ METROPOLITAN TRANSIT DISTRICT, a political subdivision of the State of California ("METRO"), and WEST BAY BUILDERS, INC. ("Contractor").

1. RECITALS

1.01 METRO's Primary Objective

METRO is a public entity whose primary objective is providing public transportation and has its principal office at 370 Encinal Street, Suite 100, Santa Cruz, California 95060.

1.02 METRO's Need for Construction of MetroBase Vehicle Maintenance Building and Related Site Work

METRO requires the construction of MetroBase Vehicle Maintenance Building and Related Site Work. In order to obtain said construction of MetroBase Vehicle Maintenance Building and Related Site Work, the METRO issued an Invitation for Bids, dated August 22, 2006 setting forth specifications for such construction of MetroBase Vehicle Maintenance Building and Related Site Work. The Invitation for Bids is attached hereto and incorporated herein by reference as Exhibit A.

1.03 Contractor's Bid Form

Contractor is a licensed general contractor desired by the METRO and whose principal place of business is 250 Bel Marin keys boulevard, Novato, California. Pursuant to the Invitation for Bids by the METRO, Contractor submitted a bid for Provision of said construction of MetroBase Vehicle Maintenance Building and Related Site Work, which is attached hereto and incorporated herein by reference as Exhibit B.

1.04 Selection of Contractor and Intent of Contract

On October 27, 2006, METRO selected Contractor as the lowest responsive, responsible bidder to provide said construction of MetroBase Vehicle Maintenance Building and Related Site Work. The purpose of this Contract is to set forth the provisions of this procurement.

1.05 Contractor and Supplier Synonymous

For the purposes of this Contract, the terms "contractor" and "supplier" are synonymous.

METRO and Contractor agree as follows:

2. INCORPORATED DOCUMENTS AND APPLICABLE LAW

2.01 Documents Incorporated in This Contract

The documents below are attached to this Contract and by reference made a part hereof. This is an integrated Contract. This writing constitutes the final expression of the parties' Contract, and it is a complete and exclusive statement of the provisions of that Contract, except for written amendments, if any, made after the date of this Contract in accordance with Part III, Section 13.14 of the General Conditions of the Contract.

a) Exhibit A

Santa Cruz Metropolitan Transit District's "Invitation for Bids (IFB) No. 06-01" dated August 22, 2006 (3 volumes) including Addendum Nos. 1 and 2.

b) Exhibit B (Bid Form)

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Contractor's Submitted Bid to METRO for the construction of the MetroBase Project, Phase 1 as signed by Contractor.

2.02 Conflicts

Refer to IFB No. 06-01, Volume I, PART I, section 1.03, item B.

2.03 Recitals

The Recitals set forth in Article 1 are part of this Contract.

3. TIME OF PERFORMANCE

3.01 General

The work under this Contract shall be completed 974 calendar days after the date of commencement specified in the Notice to Proceed, unless modified by the parties under IFB No. 06-01, Volume I, Part III, section 13.14 of the General Conditions, Instructions and Information for Bidders of this Contract or terminated pursuant to IFB No. 06-01, Volume I, Part III, section 2.

3.02 Term

The term of this Contract commences on the date of execution and shall remain in force for 974 calendar days after the date of commencement specified in the Notice to Proceed. METRO and Contractor may extend the term of this Contract at any time for any reason upon mutual written consent.

3.03 Acceptance of Terms

Execution of this documents shall be deemed as acceptance of all of the terms and conditions as set forth herein and those contained in the Notice and Invitation to Bidders, the General Conditions, the Special Conditions, the FTA Requirements for Construction Contracts, the Specifications and all attachments and addenda, which are incorporated herein by reference as integral parts of this Contract

4. SCOPE OF WORK

4.01

Contractor shall furnish METRO all supervision, labor, equipment, supplies, material, freight, transportation, tools and other work and services as specified in and in full accordance with the Invitation for Bid (IFB) No. 06-01 dated August 22, 2006 for the construction of the MetroBase Vehicle Maintenance Building and Related Site Work. The Contractor shall provide a complete project in conformance with the intent shown on the drawings and specified herein and as provided for and set forth in the IFB.

4.02

Contractor and METRO agree to comply with and fulfill all obligations, promises, covenants and conditions imposed upon each of them in the Contract Documents. All of said work done under this Contract shall be performed to the satisfaction of METRO or its representative, who shall have the right to reject any and all materials and supplies furnished by Contractor which do not strictly comply with the requirements contained herein, together with the right to require Contractor to replace any and all work furnished by Contractor which shall not either in workmanship or material be in strict accordance with the contract documents.

5. COMPENSATION

5.01 Terms of Payment

Upon written acceptance, METRO agrees to pay Contractor \$15,195,000 as identified in the Bid Form, Exhibit B, not to exceed \$15,195,000 for satisfactory completion of all work, including all costs for labor, materials, tools, equipment, services, freight, insurance, overhead, profit and all other costs incidental to the performance of the services specified

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under this contract, under the terms and provisions of this Contract within forty-five (45) days thereof. Contractor understands and agrees that if he/she exceeds the \$15,195,000 maximum amount payable under this contract, that it does so at its own risk.

5.02 Release of Claims

Payment by METRO of undisputed contract amounts is contingent upon the Contractor furnishing METRO with a Release of All Claims against METRO arising by virtue of the part of the contract related to those amounts.

5.03 Retention of progress payments

METRO will retain ten (10%) percent of the contract price from each progress payment made pursuant to the construction contract through the completion of the contract. The retention shall be released, with the exception of 150 percent (150%) of any disputed amount within 60 days after the date of completion of the work. Pursuant to Section 22300 of the Public Contract Code, the Contractor may substitute a deposit of securities in lieu of METRO withholding any monies to ensure Contractor's performance under the Contract, or alternatively, request that METRO make payment of retentions earned directly to an escrow agent at the expense of Contractor. The provisions of Public Contract Code Section 22300 are incorporated herein by reference as though set forth in full, and shall govern the substitution of securities and/or escrow account. If a Stop Notice is filed METRO will retain 125% of the amount set forth in the Stop Notice from the next progress payment made to Contractor.

5.04 Change in Contract Price

5.04.01. General

- A. The Contract price constitutes the total compensation payable to the Contractor for performing the work. All duties, responsibilities, and obligations assigned to or undertaken by the Contractor to perform the work shall be at the Contractor's expense without change in the Contract price.
- B. The Contract price may only be changed by a change order. Any request for an increase in the Contract price shall be based on written notice delivered by the Contractor to the Construction Manager promptly, but in no event later than 10 days after the date of the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the amount of the request with supporting data shall be delivered within 45 days after the date of the occurrence, unless the Construction Manager allows an additional period of time to ascertain more accurate data in support of the request, and shall be accompanied by the Contractor's written statement that the amount requested covers all amounts (direct, indirect, and consequential) to which the Contractor is entitled as a result of the occurrence of the event. No request for an adjustment in the Contract price will be valid if not submitted in accordance with this Article.
- C. The value of any work covered by a change order or of any request for an increase or decrease in the Contract price shall be determined in one of the following ways:
 1. Where the work involved is covered by unit prices contained in the Contract documents, by application of unit prices to the quantities of the items involved; or
 2. By mutual acceptance of a lump sum, which may include an allowance for overhead and profit not necessarily in accordance with Article 5.04.04; or
 3. On the basis of the cost of work (determined as provided in Articles 5.04.02. and 5.04.03.) plus a Contractor's fee for overhead and profit (determined as provided in Article 5.04.04.)

5.04.02 Cost of Work (Based on Time and Materials)

- A. General: The term "cost of work" means the sum of all costs necessarily incurred and paid by the Contractor for labor, materials, and equipment in the proper performance of work. Except as otherwise may be agreed to in writing by METRO, such costs shall be in amounts no higher than those prevailing in the locality of the project.

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- B. Labor: The cost of labor used in performing work by the Contractor, a subcontractor, or other forces, will be the sum of the following:
1. The actual wages paid plus any employer payments to or on behalf of workers for fringe benefits, including health and welfare, pension, vacation, and similar purposes. The cost of labor may include the wages paid to foremen when it is determined by the Construction Manager that the services of foremen do not constitute a part of the overhead allowance.
 2. There will be added to the actual wages as defined above, a percentage set forth in the latest "Labor Surcharge and Equipment Rental Rates" in use by the California State Department of Transportation which is in effect on the date upon which the work is accomplished. This percentage shall constitute full compensation for all payments imposed by State and Federal laws including, but not limited to, workers' compensation insurance and Social Security payments.
 3. The amount paid for subsistence and travel required by collective bargaining agreements.
 4. For equipment operators, payment for the actual cost of labor and subsistence or travel allowance will be made at the rates paid by the Contractor to other workers operating similar equipment already on the work, or in the absence of such labor, established by collective bargaining agreements for the type of workers and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of subsection 2 of Article 5.04.02.B herein, which surcharge shall constitute full compensation for payments imposed by State and Federal laws, and all other payments made to on behalf of workers other than actual wages.
- C. Materials: The cost of materials used in performing work will be the cost to the purchaser, whether Contractor or subcontractor, from the supplier thereof, except as the following are applicable:
1. Trade discounts available to the purchaser shall be credited to METRO notwithstanding the fact that such discounts may not have been taken by the Contractor.
 2. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the Construction Manager. Markup, except for actual costs incurred in the handling of such materials, will not be allowed.
 3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on extra work items or the current wholesale price for such materials delivered to the work site, whichever price is lower.
 4. If, in the opinion of the Construction Manager, the cost of material is excessive, or the Contractor does not furnish satisfactory evidence of the cost of such material, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned delivered to the work site, less trade discount. METRO reserves the right to furnish materials for the extra work and no claim shall be made by the Contractor for costs and profit on such materials.
- D. Equipment: The Contractor will be paid for the use of equipment at the rental rate listed for such equipment specified in the current edition of the Department of Transportation publication entitled, "Labor Surcharge and Equipment Rental Rates," which is in effect on the date upon which the work is accomplished. Such rental rates will be used to compute payments for equipment whether the equipment is under the Contractor's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate resulting in the least total cost to METRO for the total period of use. If it is deemed necessary by the Contractor to use equipment not listed in the foregoing publication, the Construction Manager will establish an equitable rental rate for the equipment. The Contractor may furnish cost data that might assist the Construction Manager in the establishment of the rental rate.
1. The rental rates paid, as above provided, shall include the cost of fuel, oil, lubrication supplies, small tools, necessary attachments, repairs and maintenance of all kinds, depreciation, storage, insurance, and

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all incidentals. Operators of equipment will be separately paid for as provided in subsection 4 of Article 5.04.02.B.

2. All equipment shall be in good working condition and suitable for the purpose for which the equipment is to be used.
 3. Before construction equipment is used on the extra work, the Contractor shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the Construction Manager, in duplicate, a description of the equipment and its identifying number.
 4. Unless otherwise specified, manufacturer's ratings and manufacturer-approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment, which has no direct power unit, shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
 5. Individual pieces of equipment or tools having a replacement value of \$500 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.
- E. Owner-Operated Equipment: When owner-operated equipment is used to perform work and is to be paid for as extra work, the Contractor will be paid for the equipment and operator as follows:

Payment for the equipment will be made in accordance with the provisions in Article 5.04.02.D. "Equipment."

Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the Contractor to other workers operating similar equipment already on the project, or, in the absence of such other workers, at the rates for such labor established by collective bargaining agreement for type of worker and location of the work, whether or not the owner-operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein, in accordance with the provisions in subsection 2 of Article 5.04.02(B), "Labor."

To the direct cost of equipment rental and labor, computed as provided herein, will be added the markup for equipment rental and labor as provided in Article 5.04.04, "Contractor's Fee."

- F. Equipment Time: The rental time to be paid for equipment on the work shall be the time the equipment is in productive operation on the work being performed and shall include the time required to move the equipment to the new location and return it to the original location or to another location requiring no more time than that required to return it to its original location; except, that moving time will not be paid if the equipment is used on other than the extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power. No payment will be made for loading and transporting costs when the equipment is used at the site of the extra work on other than the extra work. The following shall be used in computing the rental time of equipment on the work:
1. When hourly rates are listed, any part of an hour less than 30 minutes of operation shall be considered to be ½-hour of operation, and any part of an hour in excess of 30 minutes will be considered 1-hour of operation.
 2. When daily rates are listed, operation for any part of a day less than 4 hours shall be considered to be ½-day of operation.
 3. Rental time will not be allowed while equipment is inoperative due to breakdowns or Contractor caused delays.
- G. Cost of Work Documentation: The Contractor shall furnish the Construction Manager Daily Extra Work Reports on a daily basis covering the direct costs of labor and materials and charges for equipment whether furnished by the Contractor, subcontractor, or other forces. METRO will provide the Extra Daily Work Report forms to the Contractor. The Contractor or an authorized agent shall sign each Daily Extra Work Report. The Daily Extra Work Report shall provide names and classifications of workers

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and hours worked; size, type, and identification number of equipment; and the hours operated. Copies of certified payrolls and statement of fringe benefit shall substantiate labor charges. Valid copies of vendor's invoices shall substantiate material charges.

The Construction Manager will make any necessary adjustments. When these reports are agreed upon and signed by both parties, they shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on a later audit.

The Contractor shall inform the Construction Manager when extra work will begin so that METRO inspector can concur with the Daily Extra Work Reports. Failure to conform to these requirements may impact the Contractor's ability to receive proper compensation.

5.04.03. Special Services

Special services are defined as that work characterized by extraordinary complexity, sophistication, or innovations, or a combination of the foregoing attributes that are unique to the construction industry. The following may be considered by the Construction Manager in making estimates for payment for special services:

- A. When the Construction Manager and the Contractor, by agreement, determine that a special service is required which cannot be performed by the forces of the Contractor or those of any of its subcontractors, the special service may be performed by an entity especially skilled in the work to be performed. After validation of invoices and determination of market values by the Construction Manager, invoices for special services based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental costs.
- B. When the Contractor is required to perform work necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the jobsite, the charges for that portion of the work performed at the offsite facility may, by agreement, be accepted as a special service and accordingly, the invoices for the work may be accepted without detailed itemization.
- C. All invoices for special services will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of the allowances for overhead and profit on labor, materials, and equipment specified in Article 5.04.04. herein, a single allowance of ten (10) percent will be added to invoices for special services.

5.04.04. Contractor's Fee

- A. Work ordered on the basis of time and materials will be paid for at the actual and necessary cost as determined by the Construction Manager, plus allowances for overhead and profit which allowances shall constitute the "Contractor's Fee," except as provided in subparagraph B of this Article. For extra work involving a combination of increases and decreases in the work, the actual necessary cost will be the arithmetic sum of the additive and deductive costs. The allowance for overhead and profit shall include compensation for superintendence, bond and insurance premiums, taxes, all field and home office expenses, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Articles 5.04.02.B, C, D, and E, herein. The allowance for overhead and profit will be made in accordance with the following schedule:

Actual Necessary Cost	Overhead and Profit Allowance
Labor.....	33 percent
Materials	15 percent
Equipment.....	15 percent

- B. Labor, materials, and equipment may be furnished by the Contractor or by the subcontractor on behalf of the Contractor. When a subcontractor performs all or any part of the extra work, the allowance specified in subparagraph A of Article 5.04.04 shall only be applied to the labor, materials, and equipment costs of the subcontractors to which the Contractor may add 5 percent of the subcontractor's total cost for the extra work. Regardless of the number of hierarchal tiers of subcontractors, the 5 percent increase above

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the subcontractor's total cost, which includes the allowances for overhead and profit specified herein, may be applied one time only for each separate work transaction.

5.04.05. Compensation for Time Extensions

Adjustments in compensation for time extension will be allowed only for causes in Article 5.05.01.B.1 through Article 5.05.01.B.4 computed in accordance with Article 5.04 and the following. No adjustments in compensation will be allowed when District-caused delays to a controlling item of work and Contractor-caused delays to a controlling item of work occur concurrently or for causes in Article 5.05.01.B.5 through Article 5.05.01.B.6.

Compensation for idle time of equipment will be determined in accordance with the provisions in Article 5.04.02.E and Section 8-1.09 of the State Specifications.

5.05. Change of Contract Time

5.05.01. General

A. The Contract time may only be changed by a change order. Any request for an extension of the Contract time shall be based on written notice delivered by the Contractor to the Construction Manager promptly, but in no event later than 10 days after the date of the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the extent of the request with supporting data shall be delivered within 45 days after the date of such occurrence, unless the Construction Manager allows an additional period of time to ascertain more accurate data in support of the request, and shall be accompanied by the Contractor's written statement that the adjustment requested is the entire adjustment to which the Contractor has reason to believe it is entitled as a result of the occurrence of said event. No request for an adjustment in the Contract time will be valid if not submitted in accordance with the requirements of this Article.

The Contract time will only be extended when a delay occurs which impacts a controlling item of work as shown on the work schedules required in the Special Provisions. Time extensions will be allowed only if the cause is beyond the control and without the fault or negligence of the Contractor. Time extensions will also be allowed when District-caused delays to a controlling item of work and Contractor-caused delays to a controlling item of work occur concurrently. The Contractor will be notified if the Construction Manager determines that a time extension is not justified.

B. The Contract time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if a request is made therefore as provided in this Article. An extension of Contract time will only be granted for days on which the Contractor is prevented from proceeding with at least 75 percent of the normal labor and equipment force actually engaged on the said work, by said occurrences or conditions resulting immediately therefrom which impact a controlling item of work as determined by the Construction Manager. Such delays shall include:

1. Changes.
2. Failure of METRO to furnish access, right of way, completed facilities of related projects, Drawings, materials, equipment, or services for which METRO is responsible.
3. Survey error by METRO.
4. Suspension of work pursuant to Articles 7.05(A) and 7.05(C).
5. Occurrences of a severe and unusual nature including, but not restricted to, acts of God, fires, and excusable inclement weather. An "act of God" means an earthquake, flood, cloudburst, cyclone or other cataclysmic phenomena of nature beyond the power of the Contractor to foresee or to make preparation in defense against, but does not include ordinary inclement weather. Excusable inclement weather is any weather condition, the duration of which varies in excess of the average conditions expected, which is unusual for the particular time and place where the work is to be performed, or which could not have

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been reasonably anticipated by the Contractor, as determined from U.S. Weather Bureau records for the proceeding 3-year period or as provided for in the Special Provisions.

6. Act of the public enemy, act of another governmental entity, public utility, epidemic, quarantine restriction, freight embargo, strike, or labor dispute. A delay to a subcontractor or supplier due to the above circumstances will be taken into consideration for extensions to the time of completion.

5.05.02. Extensions of Time for Delay Due to Excusable Inclement Weather

- A. The Contract time will be extended for as many days in excess of the average number of days of excusable inclement weather, as defined in Article 5.05.01.B.5., as the Contractor is specifically required under the Special Provisions to suspend construction operations, or as many days as the Contractor is prevented by excusable inclement weather, or conditions resulting immediately therefrom, from proceeding with at least 75 percent of the normal labor and equipment force engaged on critical items of work as shown on the schedule.
- B. Should the Contractor prepare to begin work at the regular starting time at the beginning of any regular work shift on any day on which excusable inclement weather, or the conditions resulting from the weather prevents work from beginning at the usual starting time and the crew is dismissed as a result thereof, the Contractor will be entitled to a 1-day extension whether or not conditions change thereafter during said day and the major portion of the day could be considered to be suitable for such construction operations.
- C. The Contractor shall base the construction schedule upon the inclusion of the number of days of excusable inclement weather specified in the Article titled "Excusable Inclement Weather Delays," of the Special Provisions. No extension of the Contract time due to excusable inclement weather will be considered until after the said aggregate total number of days of excusable inclement weather has been reached; however, no reduction in Contract time would be made if said number of days of excusable inclement weather is not reached.

5.06. Changed Site Conditions

If any work involves digging trenches or other excavations below the surface, the Contractor shall promptly and before the following conditions are disturbed, notify METRO in writing of any:

- A. Material that the Contractor believes may be a regulated material that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
- B. Subsurface or latent physical conditions at the site differing from those indicated in this Contract.
- C. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

METRO will promptly investigate the condition and if it finds that the conditions do materially so differ, or do involve regulated material, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, METRO will issue a change order under the procedures described in this Contract. For regulated materials, METRO reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing regulated material from such areas.

In the event that a dispute arises between METRO and the Contractor on whether the conditions materially differ or on the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by this Contract but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by this Contract or by law, which pertain to the resolution of disputes and protests between the contracting parties.

5.07 Waivers and Releases

Contractor is required to provide unconditional waivers and releases of stop notices in accordance with California Civil Code §3262(d)(2). METRO agrees to pay Contractor within 30 days after receipt of an undisputed and properly

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submitted payment request from the Contractor. If METRO fails to make such payments in a timely manner, METRO shall pay interest to the Contractor equivalent to the legal rate set forth in Subdivision (a) of Section 685.010 of the Code of Civil Procedure. For purposes of this section, "progress payment" includes all payments due contractor, except that portion of the final payment designated by the contract as retention earnings. Any payment request determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven days, after receipt. A request returned pursuant to this paragraph shall be accompanied by a written explanation of why the payment request is not proper. The number of days available to METRO to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which METRO exceeds the seven-day return requirement set forth above. A payment request shall be considered properly executed if funds are available for payment of the payment request and payment is not delayed due to an audit inquiry by METRO's financial officer.

6. NOTICES

All notices under this Contract shall be in writing and shall be effective when received, if delivered by hand; or three (3) days after posting, if sent by registered mail, return receipt requested; to a party hereto at the address hereinunder set forth or to such other address as a party may designate by notice pursuant hereto.

METRO

Santa Cruz Metropolitan Transit District
370 Encinal Street
Suite 100
Santa Cruz, CA 95060

Attention: General Manager

CONTRACTOR

West Bay Builders, Inc.
250 Bel Marin Keys Boulevard
Building A
Novato CA 94949

Attention: Paul Thompson, President

7. ENTIRE AGREEMENT

- 7.01 This Contract represents the entire agreement of the parties with respect to the subject matter hereof, and all such agreements entered into prior hereto are revoked and superseded by this Contract, and no representations, warranties, inducements or oral agreements have been made by any of the parties except as expressly set forth herein, or in other contemporaneous written agreements.
- 7.02 This Contract may not be changed, modified or rescinded except in writing, signed by all parties hereto, and any attempt at oral modification of this Contract shall be void and of no effect.

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8. AUTHORITY

Each party has full power and authority to enter into and perform this Contract and the person signing this Contract on behalf of each has been properly authorized and empowered to enter into it. Each party further acknowledges that it has read this Contract, understands it, and agrees to be bound by it.

Signed on _____

METRO--SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Leslie R. White
General Manager

CONTRACTOR -WEST BAY BUILDERS, INC.

By _____
Paul Thompson
President

Approved as to Form:

Margaret Rose Gallagher
District Counsel

12.610

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT METROBASE PROJECT MAINTENANCE BUILDING

***Golf Club Drive
Santa Cruz, California***



METRO IFB No. 06-01

VOLUME 1 of 3

Part I: Instructions to Bidders

Part II: Bid Form

Part III: General Conditions of the Contract

Part IV: Special Conditions of the Contract

Part V: Contract

Part VI: FTA Requirements for Construction Contracts

Part VII: Protest Procedures

GEOTECHNICAL INVESTIGATION INFORMATION

Construction Documents Project Manual

**Construction Documents dated June 29, 2006
(IFB dated August 22, 2006)**

Architect's Project No.: 6040-1569-01



**800 Wilshire Boulevard; Suite 400
Los Angeles, California 90017**

DOCUMENT 00005

CERTIFICATIONS PAGE

Santa Cruz Metropolitan Transit District
Metrobase Project, Maintenance Building

Volume 1 of 3: Introductory Information, Bidding and Contracting Requirements

We hereby certify that these Contract Documents have been prepared by us or under our direct supervision in accordance with the rules and regulations governing the Architects and Engineers practicing in the State of California.

Architect

RNL Design
800 Wilshire Boulevard; Suite 400
Los Angeles, Ca 90017

DOCUMENT 00006

PROJECT DIRECTORY

Santa Cruz Metropolitan Transit District
Metrobase Project, Maintenance Building

Owner		
Santa Cruz MTD 370 Encinal Street; Ste. 100 Santa Cruz, CA 95060	Les White lwhite@scmttd.com Frank Cheng fcheng@scmttd.com	831-426-6080 Fax 831-426-6117
Architect		
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Civil Engineer		
Mesiti-Miller Engineering 224 Walnut Avenue; Ste.B Santa Cruz, CA 95060	Mark Mesiti-Miller mark@mme.com Jim Putnam jim@m-me.com	831-426-3186 Fax 831-426-6607
Landscape Architect		
Joni L. Janecki & Associates 303 Potrero Street; Ste. 16 Santa Cruz, CA 95060	Joni Janecki jlj@jlja.com Nicole Steel njs@jlja.com	831-423-6040 Fax 831-423-6054
Structural Engineer		
Mesiti-Miller Engineering 224 Walnut Avenue; Ste.B Santa Cruz, CA 95060	Mark Mesiti-Miller mark@mme.com Dale Hendsbee dale@m-me.com	831-426-3186 Fax 831-426-6607
Maintenance Equipment Consultant		
Maintenance Design Group 55 Waugh Drive; Ste. 800 Houston, TX 77007	Mark Ellis ellisma@c-b.com James Bond	713-803-2350 Fax 713-869-2556
Security / Data Consultant		
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Mechanical Engineer		
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Metrobase Project, Maintenance Building

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SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Invitation for Bids (IFB) for Construction of MetroBase Vehicle Maintenance Building And Related Site Work

METRO IFB No. 06-01

Date Issued: AUGUST 22, 2006

Bid Deadline: 2:00 p.m., OCTOBER 17, 2006



Contents of this IFB

1. Volume 1:
 - Part I. Instructions to Bidders
 - Part II. Bid Form
 - Part III. General Conditions of the Contract
 - Part IV. Special Conditions of the Contract
 - Part V. Contract
 - Part VI. FTA Requirements for Construction Contracts
 - Part VII. Protest Procedures
- Attachment A – Disadvantaged Business Enterprise Information
- Attachment B - Standard Agreement For Subcontractor/DBE Participation
2. Volume 2: Contracting Requirements; Divisions 1-9
3. Volume 3: Contracting Requirements; Divisions 10-16
4. Construction Drawings

PART I
INSTRUCTIONS TO BIDDERS

1.01 THE PUBLIC WORK

- A. The Santa Cruz Metropolitan Transit District (METRO) is requesting sealed bids for a fixed-price contract for the construction of the MetroBase Vehicle Maintenance Building and Related Site Work. This public work shall include the furnishing of all supervision, labor, materials, freight, transportation, equipment, supplies, tools, services and other work as defined in the Invitation For Bid (IFB) No. 06-01 for this Project.
- B. This public work is funded in part with federal assistance and as a result, the Bidder must adhere to all federal requirements, which are a part of this contract. This includes the requirement of submitting with the Bid certain certifications required by federal laws and regulations. By submitting a Bid, the Bidder warrants that it has read and understood the entire IFB including Part VI of the IFB and agrees to fulfill all the requirements including Part VI if selected as the contractor.

1.02 RESERVED

1.03 COORDINATION, INTERPRETATION, AND EXAMINATION OF CONTRACT DOCUMENTS

CONTENTS: This Invitation for Bids (IFB) includes three volumes and the construction drawings. Volume 1 includes the following parts: (I) Instructions to Bidders, (II) Bid Form, (III) General Conditions of the Contract, (IV) Special Conditions of the Contract, (V) Contract, (VI) FTA Requirements for Construction Contracts, and (VII) Santa Cruz Metropolitan Transit District Protest Procedures. Volumes 2 and 3 include the specifications for the construction of Phase II of the MetroBase Project, including the administration and management of the construction. The construction drawings are identified separately. The Final Contract with the Successful Bidder will be in the form and substance of the Contract (Part V) included in the IFB.

- A. All contractual provisions required by DOT, as set forth in Part VI and FTA Circular 4220.1E are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms (Part VI) shall be deemed to control in the event of a conflict with other provisions contained in this Contract. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any METRO requests, which would cause METRO or contractor to be in violation of the FTA terms and conditions.
- B. In the event of inconsistencies between requirements contained in different components of the contract documents, provisions in Part I, and III prevail over the remaining contract documents. In resolving other conflicting requirements among the Contract Documents, the order of precedence shall be as follows: 1. Change Orders, 2. Part V, 3. Addenda or Letters of Clarification, 4. Part IV of the Contract, 5. Contracting Requirements Divisions 1-16, 6. Drawings, With reference to Drawings: 1. Figures govern over scaled dimensions, and 2. Detailed drawings govern over general drawings.
- C. The Bidder shall thoroughly examine and become familiar with all of the various parts of the contract documents and determine the nature and location of the work, the general and local conditions and all other matters, which can in any way affect the work under this contract. Failure to make an examination necessary for this determination shall not release the bidder from the obligations of this contract. No oral contract or conversation with any Director, officer, agent or employee of METRO, either before or after the execution of the contract, shall affect or modify any of the terms or obligations contained herein.

1.04 PRE-BID CONFERENCE AND JOB WALK

A pre-bid conference will be held on SEPTEMBER 6, 2006 at 9:00 a.m. at the following location:

Santa Cruz Metropolitan Transit District
110 Vernon Street, Suite B
Santa Cruz, California 95060

- A. This will be followed by a job walk on the same day at the project sites, to physically inspect the property on which the vehicle maintenance facility will be located, and further clarify the Scope of Work.
- B. The pre-bid conference will consist of a discussion of the project requirements followed by a question and answer period. In the job walk, METRO will answer questions raised by the potential bidders during and after the tour of the properties on which the facilities will be constructed.

Attendance at the pre-bid conference and job walk is strongly encouraged.

- C. Questions regarding the IFB should be submitted in writing to the Purchasing Agent at 110 Vernon Street, Suite B, Santa Cruz, CA 95060 prior to the pre-bid meeting in order to allow METRO staff sufficient time to prepare responses. Written questions submitted prior to and questions raised at the pre-bid conference and job walk will be answered, if appropriate, by written addenda to the IFB. Upon posting or delivery, such addenda will become a part of the bid documents and binding on all eligible bidders.

1.05 QUESTIONS, CLARIFICATIONS AND IFB REVISIONS

- A. METRO has made every attempt to provide all information needed by bidders for a thorough understanding of the project terms, conditions and other requirements. It is expressly understood that it is Bidder's responsibility to examine and evaluate the work required under this IFB and the terms and conditions under which the work is to be performed. If omissions, discrepancies, apparent errors or a need for clarification or explanation are found in the IFB, including the architectural or engineering plans and specifications prior to the date of bid opening, the Bidder shall report such to METRO in writing and request a clarification from the METRO which, if substantiated, will be given in the form of addenda to all Bidders. The submission of a bid proposal shall be conclusive evidence that the Bidder has satisfied itself through its own investigation as to the conditions to be encountered, the character, quality and scope of work to be performed, the materials and equipment to be furnished and all requirements of the IFB. Written questions and/or written requests for clarification should be directed to:

Santa Cruz Metropolitan Transit District
110 Vernon Street, Suite B
Santa Cruz, CA 95060
Attn: Lloyd Longnecker, Purchasing Agent
E-mail: llongnecker@scmttd.com
Phone (831) 426-0199
FAX: (831) 469-1958

- B. METRO reserves the right to revise the IFB prior to the bid opening. Such revisions, if any, will be made by addenda to this IFB. Copies of such addenda will be furnished to all those who attend the Pre-Bid conference. If an addendum includes significant changes, the bid opening due date may be postponed by a number of days that the METRO considers appropriate for Bidders to revise their Bids. The announcement of a new date, if any, will be included in the addendum. In any event, the last addendum will be issued no later than fifteen (15) calendar days prior to the bid opening. Bidders shall acknowledge receipt of all addenda to the IFB Documents in their Bid. Failure to acknowledge receipt of all addenda may render the bid non-responsive.

1.06 SPECIFICATIONS BY BRAND OR TRADE NAME

METRO does not intend in any manner to limit the bidding directly or indirectly by calling for a designated material, product, thing, or service by a specific brand or trade name. If a brand or trade name exists in the IFB, the words "or equal" are intended to follow so that bidders may furnish any equal material, product,

thing, or service. A Bidder shall submit data substantiating a request for a substitution of “an equal item” by SEPTEMBER 22, 2006. METRO will inform all bidders of the request in the final addendum and whether METRO accepts or rejects the requested substitution.

1.07 EXPENSES TO BE INCLUDED IN BID PRICE:

- A. Unless otherwise specified in the IFB, the bid price shall include all expenses necessary that go into constructing MetroBase Vehicle Maintenance Building and Related Site Work under the IFB complete and ready for immediate use by the METRO without additional expense. Bid price shall include, without limitation, all costs for labor, services, equipment, materials, supplies, transportation, installation, overhead, packing, cartage, insurance, license, fees, taxes, permits, bonds, inspection, tools and other expenses necessary to satisfy the provisions of the IFB, expressed and implied.
- B. Unless bidder is specifically instructed to do otherwise in the Specifications section of this IFB, sales taxes shall be included in the bid price in the amount of 8.25 % of the total bid price. Federal Excise Tax, from which the METRO is exempt, should not be included in the bid price. A Federal Excise Tax Exemption certificate will be furnished to the successful Bidder upon request.
- C. Samples of items, when required, must be furnished free of expense to the METRO and, if not destroyed by tests, may upon request, made at the time the samples are furnished, be returned at Bidder's expense.
- D. Should any unit price be left blank, the bid will be considered non-responsive unless the blank item can be calculated from the information available (i.e., unit price can be determined by dividing the total price by the estimated quantity).
- E. Should any total price be left blank, the bid will be considered non-responsive unless the blank item can be calculated from the information available (i.e., total price can be determined by multiplying the unit price by the estimated quantity).
- F. If any one line item is left blank, and the above situations do not apply, no attempt will be made to reconcile the amounts. The bid in this case will be considered non-responsive.
- G. The Contractor shall prepare and submit for the Construction Manager a detailed cost breakdown to serve as the basis for progress payments before work commences, this breakdown is to serve as the basis for progress payments and is to be submitted before work commences. The cost breakdown shall be segmented into basic items of work corresponding to the Schedule of Work with the aggregate equaling the Contract total. Cost breakdowns containing prices that appear to be unbalanced may be rejected.

The following general guidelines shall be followed:

1. There must be sufficient detail included to allow the Construction Manager to verify progress in accordance with the progress payments specified elsewhere. As a minimum, the cost of each Specification section shall be identified.

2. Each price must include the cost of material, equipment, and labor stated separately.

The Construction Manager will not make progress payments until the detailed cost breakdown has received favorable review

1.08 INELIGIBLE PARTICIPANTS

Contractors or subcontractors who are ineligible from bidding on or performing public works contracts pursuant to California Labor Code §§1777.1 and/or 1777.7 and/or California Public Contract Code §6109 are prohibited from participating in this procurement. Bidders are prohibited from performing work on this Project with a subcontractor who is ineligible to perform work on public projects pursuant to Labor Code §1777.1 and/or Labor Code §1777.7. Any Bidder or subcontractor who is ineligible to perform work on

public works projects pursuant to Labor Code §1771.1 and §1771.7 and/or Public Contract Code §6109 shall not bid on this Project and shall not be awarded the contract or any part thereof.

1.09 CONTRACTOR'S LICENSE REQUIRED

The work to be performed under the IFB require that the Contractor possess at the time that this contract is awarded a class "A" or "B" license under the provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California to do the type of work contemplated in the IFB and the Bidder shall be skilled and regularly engaged in the general class or type of work called for under this IFB. Bidder shall only hire subcontractors for this Project who are properly licensed for the work each is contracted to perform in accordance with federal and state laws.

Any bidder or contractor not so licensed shall be subject to all legal penalties imposed by law, including but not limited to any appropriate disciplinary action by the Contractors' State License Board. Failure of the Bidder to obtain proper and adequate licensing for an award of a contract shall constitute a failure to execute the contract and shall result in the forfeiture of the security of the bidder.

1.10 PREVAILING WAGE REQUIRED

Pursuant to Section 1773 of the California Labor Code, the general prevailing rate of wages for this Project has been determined by the Director of the Department of Industrial Relations, and such prevailing rate of wages is listed in the State of California, Business and Transportation Agency, Department of Transportation Publication entitled General Prevailing Wage Rates, current edition, and may be accessed online at http://www.dir.ca.gov/DLSR/statistics_research.html#PWD or at METRO's Administration Offices located at 370 Encinal, Suite 100, Santa Cruz. The Contractor shall forfeit, as penalty to the METRO, fifty dollars (\$50.00) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for any work done under the contract by it or by any subcontractor under it, in violation of the provisions of such Labor Code. (See also federal law requirements in Part VI-FTA Requirements for Construction Contracts).

1.11 BID PREPARATION

Bidders shall complete the entire Bid Form (Part II), including each required document in accordance with the following:

- A. The bidder shall not delete, modify, or supplement the printed matter in the Bid Form or make substitutions. Blank spaces in the Bid Form shall be properly filled. The phraseology of the Bid Form must not be changed, and no additions shall be made to the items mentioned therein. Alterations by erasure or interlineations must be explained or noted in the bid over the signature of the Bidder.
- B. The Bidder shall execute and submit all FTA Certifications as described in item 1.12 below.
- C. The Bid Form and all accompanying documents shall be completed in ink or typed.
- D. The bidder shall sign the bid in the blank space provided. If bidder is the sole owner, the owner shall sign the bid with his/her full name, address and phone number. If bidder is a corporation, two (2) corporate officers must sign on behalf of the corporation as follows: (1) the chairman of the board, president, or vice president; and (2) the secretary, assistant secretary, chief financial officer, or assistant treasurer. If bidder is a partnership, the true name of the firm shall be set forth above; the names and addresses of all partners shall be given and a partner in the firm shall sign the bid authorized to sign contracts on behalf of the partnership. If the bidder is a joint venture, the bid shall be signed by each participating company, by officers, or other individuals who have the full and proper authorization to do so. If the bid is signed by an agent of the bidder, other than an officer of a corporation or a member of a partnership, a notarized power-of-attorney must be on file with METRO prior to opening of bids, or must be submitted with the bid. If requested by METRO, the bidder shall promptly submit evidence satisfactory to METRO of the authority of the person signing the bid. If satisfactory evidence of authorization is not provided, the Bid will be rejected as irregular and unauthorized.

1.12 BID CONTENTS

Bids shall include, but not be limited to, the following:

- A. Completion and submittal of the Bid Form and the Bidder's Declarations and Statement of Understanding and that Bidder can meet the licensing requirements at the time of the award. (Bid Form Document 1)
- B. The Bidder shall provide sufficient information to demonstrate to METRO's satisfaction that the Bidder is responsible. Criteria used by the METRO to determine Bidder responsibility includes, without limitation, whether Bidder and its proposed subcontractors have the skill, experience, necessary facilities and financial resources to perform the Contract in a satisfactory manner and within the required time. A brief description of the history and background of the firm, including a statement of the bidder's qualifications and experience in performing the type of work required for this project must be submitted by the Bidder. The Bidder shall complete and submit the Statement of Bidder's Qualifications, Experience, Financial viability and Ability and Project Capacity with the Bid Form. (Bid Form Document 2)
- C. Completed Non-Collusion Affidavit (Bid Form-Document 3)
- D. Completed Bidder's Bond or documentation in support of required Bidder's security. (Bid Form-Document 4)
- E. Completed Certification of Proposed Contractor Regarding Debarment, Suspension and other Ineligibility and Voluntary Exclusion (For Contracts over \$100,000). (Bid Form- Document 5)
- F. Completed Certification of Proposed Subcontractor regarding Debarment, Suspension and other Ineligibility and Voluntary Exclusion (For Subcontracts totaling over \$100,000). (Bid Form-Document 6)
- G. Completed Certification of Proposed Subcontractor regarding Debarment, Suspension and other Ineligibility and Voluntary Exclusion (For subcontracts totaling \$100,000.00 or less)
- H. Disclosure of Governmental positions (Bid Form-Document 8).
- I. A statement listing each subcontractor who will perform work in excess of one-half percent of the total bid proposed for the project. Completion and submittal of Designation of Subcontractors. (Bid Form-Document 9)
- J. Completed Buy America Certificate (Bid Form- Document 10)
- K. Completed Certification Regarding Lobbying (Bid Form-Document 11)
- L. Completed Disadvantaged Business Enterprise (DBE) Certificate (Bid Form-Document 12)
- M. Completed Statement of Compliance (Bid Form-Document 13)
- N. Apprenticeship Employment Certification (Bid Form-Document 14)
- O. Completed Workers' Compensation Certification (Bid Form-Document 15)
- P. Completed Conflict of Interest Statement (Bid Form-Document 16).

1.13 BID SUBMISSION

- A. To be considered, one (1) original of the bid must be received by **2 p.m. Pacific Standard time on OCTOBER 17, 2006** at the Santa Cruz Metropolitan Transit District, 110 Vernon Street, Suite B,

Santa Cruz, California 95060, Attn: Lloyd Longnecker, Purchasing Agent. **Bids received after the deadline or delivered to a different location will be returned, unopened.**

- B. Each bid must be submitted in a sealed envelope and be clearly marked to show the bidder's name and the contract name and number, without being opened. **Faxed or electronic bids will not be accepted. All portions of the Bid are to be completed before the Bid is submitted. Failure to do so may result in the bid being rejected as non-responsive.**
- C. All Bidders are put on notice that any collusive agreement fixing the prices to be bid so as to control or affect the awarding of this Contract is in violation of the METRO's competitive bidding requirements and may render void any Contract let under such circumstances.
- D. Any Bid submitted shall remain valid for a period of sixty (60) days from the date of the Bid Opening. However, the successful Contractor shall have no rights to the contract until the Contract has been fully executed by the METRO and a Notice to Proceed has been issued to the Contractor.

1.14 PUBLIC OPENING OF BIDS

Bids will be publicly opened and each bidder's price shall be read aloud on OCTOBER 17, 2006, at 2:30 p.m. or as soon thereafter as possible, at 110 Vernon Street, Suite B, Santa Cruz, California. Bidders, their authorized representatives and others interested are invited to be present. The remaining content of the bids shall not be made public until after the award is made by METRO's Board of Directors.

1.15 RECEIPT OF SINGLE BID BY METRO

If only one bid is received in response to the IFB, a cost/price analysis of the bid may be performed to determine if the bid price is fair and reasonable. The Bidder may be required to submit to METRO within five (5) days of METRO demand, a detailed cost proposal. The Bidder shall cooperate with METRO in completing and submitting detailed information for the cost and price analysis.

1.16 DISQUALIFICATION OF BIDDERS

- A. More than one bid from an individual, firm, partnership, corporation, or combination thereof under the same or different names will not be considered. Reasonable grounds for believing that any individual, firm, partnership, corporation, or combination thereof is interested as a principal in more than one bid for the work contemplated, may cause the rejection of all bids in which such individual, firm, partnership, corporation, or combination thereof is interested. If there is reason for believing that collusion exists among the bidders, any or all bids may be rejected. A party who has quoted prices on materials or work to a bidder is not thereby disqualified from quoting prices to other bidders, or from submitting a bid directly for the materials or work. A bid may be rejected on the basis of a bidder, any officer of such bidder, or any employee of such bidder who has a proprietary interest in such bidder having been disqualified, removed, or otherwise prevented from bidding on, or completing, a federal, state, or local project because of a violation of law or a safety regulation.
- B. Pursuant to California Public Contract Code Section 7106, a bidder shall execute and submit with its bid, a duly notarized "Affidavit of Non-Collusion" on the form included in the IFB. Upon execution of the Affidavit, the bidder represents and warrants that such bid is genuine and not a sham or collusive or made in the interest or on behalf of any person not therein named, and that the bidder has not, directly or indirectly, induced or solicited any other bidder to put in a sham bid, or any other person, firm, or corporation to refrain from bidding, and that the bidder has not in any manner sought by collusion to secure to the bidder an advantage over any other bidder.
- C. If at any time it shall be found that the person, firm or corporation to whom a contract has been awarded has, in presenting any bid or bids, colluded with any other party or parties, then the contract so awarded shall be null and void and the Contractor and its bondsmen shall be liable to METRO for all loss or damage which METRO may suffer thereby and the Board of Directors may advertise for a new contract for construction of the Project.

1.17 WITHDRAWAL OF BIDS

A bidder may withdraw its bid at any time **before** the time established in the IFB for the opening of bids only by filing a written notice with the Purchasing Agent. An oral notice of withdrawal is ineffective.

1.18 METRO RIGHTS

METRO may investigate the qualifications of any Bidder under consideration inclusive of, but not limited to, the information provided in the Bid. METRO may require confirmation of information furnished by the Bidder and require additional evidence of qualifications to perform the Work described in this IFB. METRO reserves the right to:

- A. Reject any or all of the bids, at its discretion;
- B. Reject any bid that, in the opinion of METRO, is so unbalanced in comparison to other bids received and/or to METRO's internal estimates that it does not accurately reflect the cost to perform the Work;
- C. Cancel the entire IFB;
- D. Issue Subsequent IFB;
- E. Appoint evaluation committees to review bids;
- F. Seek the assistance of outside technical experts to evaluate bids;
- G. Disqualify the bid(s) upon evidence of collusion with intent to defraud or other illegal practices on the part of the Bidder(s); and
- H. Waive any errors or informalities in any bid or in the bidding procedure, to the extent permitted by law.

This IFB does not commit METRO to award or enter into a contract nor does it obligate the METRO to pay for any costs incurred in the preparation and submission of bids or in anticipation of a contract.

METRO may reject the bid of any party who has been delinquent or unfaithful in any former contract with the METRO. METRO may reject a bid from a Bidder who cannot satisfactorily prove that it is responsible as required in the IFB or whose Bid is not responsive.

Bids may be rejected if they show such items as: any alteration of form; additions not called for; conditional bids; incomplete bids; erasures; irregularities which make the bids incomplete, indefinite, or ambiguous; obviously unbalanced prices; no acceptable bid security; signature by other than an authorized person; addenda not properly acknowledged; failure to use designated Bid Form; bid materially fails to conform to the requirements of the bid documents or if the bid is not properly executed.

1.19 RELIEF OF BIDDERS

A bidder, after the bid opening, shall not be relieved of the bid unless METRO consents in writing. Such relief may be obtained by submitting a written request for its withdrawal to the Purchasing Agent. No change to the bid shall be made because of a mistake, except as provided in Section 5100 et. seq. of the Public Contract Code. The bidder is cautioned that, pursuant to Public Contract Code 5105, a bidder who claims a mistake or who forfeits its Bid Security shall be prohibited from participating in further bidding on the project in which the mistake was claimed or security forfeited.

1.20 PROTEST PROCEDURES

- A. Protest before Bid Opening

Bid protests based upon the content of the IFB, restrictive specifications or alleged improprieties in the bidding procedure shall be filed in writing with the Purchasing Agent, ten (10) calendar days prior to the bid opening date. The protest must clearly specify the grounds on which the protest is based and include any supporting information.

B. Protest of Award

A bidder (or other interested party as defined under METRO's Protest Procedures) may file a protest with METRO alleging a violation of applicable federal or state law and/or METRO policy or procedure relative to the seeking, evaluating and/or awarding of the contract. Such protest must be filed no later than five (5) calendar days after the METRO's staffs' recommendation and Notice of Intent to award is issued to the bidders.

C. Protest Procedures Available

Copies of METRO's Procurement Protest Procedures are part of the IFB (Part VII). **FAILURE TO COMPLY WITH ANY OF THE REQUIREMENTS SET FORTH IN METRO'S WRITTEN PROTEST PROCEDURES MAY RESULT IN REJECTION OF THE PROTEST.**

1.21 RESERVED

1.22 RESERVED

1.23 PROHIBITED INTERESTS

- D. By submitting a bid, the bidder represents and warrants that neither the General Manager, nor any Director, officer, agent, or employee of METRO is in any manner interested directly or indirectly in the bid or in the contract which may be awarded under it, or in any expected profits to arise there from (State of California Government Code section 1090 et seq.).
- E. No member, officer, agent, or employee of METRO or any public entity during his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in the contract to be awarded.

1.24 GRATUITIES

- A. It is improper for any METRO officer, employee or agent to solicit consideration, in any form, from a Bidder with the implication, suggestion or statement that the Bidder's provision of the consideration may secure more favorable treatment for the Bidder in the award of the contract or that the Bidder's failure to provide such consideration may negatively affect the METRO's consideration of the Bidder's submission. A Bidder shall not offer or give, either directly or through an intermediary, consideration, in any form, to a METRO officer, employee or agent for the purpose of securing favorable treatment with respect to the award of the contract.
- B. A Bidder shall immediately report any attempt by a METRO officer, employee or agent to solicit such improper consideration. The report shall be made to METRO's Purchasing Agent at 831-426-0199. Failure to report such a solicitation may result in the Bidder's submission being eliminated from consideration.
- C. Among other items, such improper consideration may take the form of cash, discounts, services, the provision of travel or entertainment, or tangible gifts.

1.25 REQUIRED CERTIFICATIONS

Bids shall include all required Certifications, including a statement that the insurance requirements set forth in the IFB can be obtained and will be carried without reservation or exclusion should bidder be awarded a contract pursuant to the IFB.

1.26 SUBCONTRACTING

- A. The bidder shall submit with his/her bid the names and business addresses of each subcontractor who will perform work under the contract in excess of ½ of 1 percent of the amount of the total bid and shall list the portion of the work which will be done by each subcontractor. This information shall be supplied on the Designation of Subcontractors Form, which is part of the Bid Form. Attention is directed to the requirements of Sections 4100 to 4114, inclusive, of the California Public Contract Code, which are applicable to this contract. The contractor shall not, without the consent of METRO, either substitute any person as subcontractor in place of the subcontractor designed in the original List of subcontractors, or sublet or subcontract any portion of the work in excess of ½ of 1 percent of the total amount of his/her bid for which he/she did not originally designate a subcontractor. When a portion of the work, which has been subcontracted by the contractor, is not being performed in a manner satisfactory to METRO, the subcontractor shall be removed immediately on the request of METRO, and shall not again be employed on the work.
- B. The contractor will require, by written Contract, each subcontractor to be bound to the contractor by the terms of the contract documents, and to assume toward the contractor, all the obligations and responsibilities which the contractor, by the contract documents, assumes toward METRO, to the extent of the work to be performed by the subcontractor. Each subcontract shall preserve and protect the rights of METRO under the contract documents with respect to the work to be performed by the subcontractor so that subcontracting will not prejudice such rights.

1.27 BOND REQUIREMENTS

A. Bidders Security

1. All bids must be accompanied by bidder security in an amount not less than ten percent (10%) of the Total Contract Price, payable to METRO. The Bidder's Security must be in the form of cash, a cashier's check, a certified check, or a Bidder's Bond or a combination thereof. If a Bidder's Bond is furnished, it must conform to the form enclosed in the IFB. (Bid Form, Part II)
2. Documents and the surety thereon must be a fully qualified surety company acceptable to METRO, listed as a company possessing the authority to issue surety bonds in the State of California. Bidder's securities will be held until the Contract has been fully executed, after which all Bidders' securities, except any Bidders securities which have been forfeited, will be returned to the respective Bidders as soon as practicable but in no event beyond sixty days from the award of the contract.

B. Payment Bond

A payment bond in the form set forth in the IFB (Part V) shall be executed within ten working days after the signing of a Contract in an amount not less than one hundred percent (100%) of the Contract price. The payment bond shall provide METRO with security for Contractor's full payment to all subcontractors for costs of materials, equipment, supplies, and labor furnished in the course of performance of the Contract.

C. Performance Bond

A performance bond in the form set forth in the IFB (Part V) shall be executed within ten working days after the signing of a Contract in an amount not less than one hundred percent (100%) of the Contract price. The performance bond shall guarantee the Contractor's faithful performance of the Contract in compliance with all terms, conditions and requirements specified in the Contract documents.

1.28 AWARD OF CONTRACT

- A. METRO will make an award to the lowest responsible bidder, whose bid is responsive to all the requirements of the IFB. Any such award will be made pursuant to a Notice of Award signed by

METRO within 60 days after bid opening. If the lowest responsive, responsible Bidder refuses or fails to execute the contract, METRO may award the contract to the next lowest responsive, responsible Bidder or solicit new bids.

- B. The Santa Cruz Metropolitan Transit District will not discriminate with regard to race, color, ancestry, national origin, religion, sex, sexual orientation, marital status, age, medical condition or disability in the consideration for an award.
- C. METRO will select the lowest responsible bidder based on a determination of (1) which bidder is the lowest monetary bidder on the Base Bid; (2) whether or not the lowest monetary bidder submitted a responsive bid; and (3) whether or not the lowest monetary bidder is responsible.
- D. The lowest monetary bidder shall be determined based on the total unit price amounts (Base Bid).
- E. A bid will be determined to be responsive if it does what the bidding instructions demand and all required documentation is provided. The following factors will be evaluated:

<u>RESPONSIVE FACTORS</u>	<u>CRITERIA</u>
1. Bidder's Bond	Pass/Fail
2. Completed Documentation and Required Certification Submitted	Pass/Fail
3. Bid Meets IFB Requirements	Pass/Fail

- F. Responsibility is defined as the apparent ability of the Bidder to meet and successfully complete the requirements of the Contract. Responsibility includes consideration of a Bidder's trustworthiness, the quality of past performance, financial ability, and the fitness and capacity to do the proposed work in a satisfactory and safe manner. Bidder may be required to present further evidence that it has successfully performed similar work of comparable magnitude or provide other proof satisfactory to METRO that it is competent to successfully perform the Work. The following factors will be evaluated:

<u>RESPONSIBILITY FACTORS</u>	<u>CRITERIA</u>
1. Quality of Past Performance and Experience	Pass/Fail
2. Key Personnel Experience	Pass/Fail
3. Financial Viability and Ability	Pass/Fail
4. Fitness and Capacity to do the Proposed Work	Pass/Fail

1.29 EXECUTION OF CONTRACT

The bidder to whom an award is made shall execute the contract and furnish the required proof of Insurance and payment and performance bonds within ten (10) working days after receipt of Notice of Award. All required documents shall be returned to the Purchasing Agent, 110 Vernon Street, Suite B, Santa Cruz, California 95060.

1.30 USE OF CONSULTANTS

- A. No limitation shall be imposed on METRO's use of Consultants in any activity related to the Scope of Work. The Consultants, if any, at the direction of METRO's Project Manager, shall be accorded the same access to facilities and participation in the work activity as any member of METRO's project team. Involvement of Consultants may include, but shall not be limited to, supervision of construction, contract administration, inspection, progress and technical meetings, conference calls, document review, etc., as directed by METRO.
- B. METRO shall have the option of adding Consultants to the distribution list to receive all or selected contract documents.

1.31 PUBLIC RECORDS ACT

- A. Responses to this IFB shall be subject to the provisions of the California Public Records Act (Government Code Sections §6250 et. seq.).
- B. The Bidder may label information as “Trade Secret”, “Confidential” or “Proprietary”. METRO will not advise as to the nature or content of documents entitled to protection from disclosure under the California Public Records Act. METRO will use its best efforts to inform the Contractor of any request for any documents provided by the Bidder to METRO marked “Trade Secret”, “Confidential”, or “Proprietary”. However, it is incumbent on the Contractor to assert any rights to confidentiality and to seek and obtain a court order prohibiting the release of such information.
- C. Under no circumstances, will METRO be responsible or liable to the Bidder or any other party for the disclosure of any such labeled information, whether the disclosure is required by law or a court order or occurs through inadvertence, mistake, or negligence on the part of METRO or its officers, employees, agents, and/or Contractors.
- D. The Bidder, at its sole expense and risk, shall be responsible for prosecuting or defending any action concerning the information contained in the IFB and shall hold METRO harmless from all costs and expenses, including attorney’s fees, in connection with such actions.

1.32 DISADVANTAGED BUSINESS ENTERPRISES

- A. This contract is subject to the requirements of Title 49, Code of Federal Regulations Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Finance Assistance Program. The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. A contract goal of 15% DBE participation has been established for this procurement.
- B. Bidders are required to document sufficient DBE participation to meet METRO’s established contract goal or, alternatively, document adequate good faith efforts to do so as provided for in 49 CFR 26.53. Award of this contract is conditioned on submission of the following documentation concurrent with and accompanying the sealed bid:
 - 1. The names and addresses of DBE firms that will participate in this contract;
 - 2. A description of the work each DBE will perform;
 - 3. The dollar amount of the participation of each DBE firm participating;
 - 4. Written documentation of the bidder’s commitment to use a DBE whose participation it submits to meet the goal;
 - 5. Written confirmation from the DBE that it is participating in the contract as provided in the Bidder/Contractor’s commitment;
 - 6. If the contract goal is not met, evidence of good faith efforts to do so.
- F. For a listing of Certified Disadvantaged Business Enterprise (DBE) firms, please go to the State of California, Caltrans website address: <http://www.dot.ca.gov/ucpquery/index2.jsp> This site will provide access to the State’s Unified Certification Program for DBE listings that are updated daily.

1.33 REPORTS AND INVESTIGATIONS

Bidders are advised that an investigation of subsurface conditions has been made by METRO in respect to foundation requirements and/or other design issues. Bidders may inspect the records of METRO as to such investigation, including examination of samples and drill cores, if any. When logs of test boring showing a record of the data obtained by METRO’s investigation of subsurface conditions are made available, said logs represent only the opinion of METRO as to the character of material encountered by it in its test borings and are made available only for the convenience of bidders.

Note that METRO’s investigation of subsurface conditions is made for the purpose of design. METRO assumes no responsibility whatever in respect to the sufficiency of test borings, or accuracy of the log of test borings, or other preliminary investigations, or of the interpretation thereof. There is no guarantee

expressed or implied that the conditions indicated are representative of those existing throughout the work, or any part of it, or that unforeseen developments may not occur.

No information derived from such inspection of records or preliminary investigations made by METRO, or from the Engineer, or from assistants, or from the maps, Specifications, profiles, or Drawings will in any way relieve the Contractor from any risk or from properly fulfilling all the terms of the Contract. Records of such preliminary investigations as may have been made by METRO may be inspected at 110 Vernon Street, Santa Cruz. Documents include the Environmental Impact Report, City of Santa Cruz Noise Ordinance and the IFB plans and specifications.

Bidders are advised that an Environmental Impact Report has been prepared for this project. Bidders may inspect this document at METRO's Administration Office located at 370 Encinal Street, Suite 100, Santa Cruz, California. This document is made available for review by the bidder and nothing in the contract documents will in any way relieve the Contractor from properly fulfilling all the requirements during construction stated in the Report.

1.34 AUTHORITY OF THE CONSTRUCTION MANAGER

METRO has entered into an agreement with Harris and Associates to provide third party Construction Management. The Notice to Proceed will provide the Contractor the name and contact information for the individual who is METRO's Construction Manager for this Project. METRO retains the right to change the Construction Manager at its discretion and will notify Contractor within twenty-four (24) hours of such change. The Construction Manager shall decide all questions that may arise as to the quality or acceptability of materials furnished and work performed and rate of progress of the work, all questions that may arise as to the interpretation of the Drawings and Specifications, and all questions as to the acceptable fulfillment of the Contract on the part of the Contractor. The Construction Manager's decision shall be final. The Construction Manager shall have authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly.

1.35 PERMITS

Metro is a self-permitting government agency. City of Santa Cruz permits are waived. All state required permits must be obtained.

**II. BID FORM
Document 1**

FOR: Construction of the MetroBase Maintenance Building and Related Site Work

BID TO: Santa Cruz Metropolitan Transit District
Attention: Lloyd Longnecker, Purchasing Agent
110 Vernon Street, Suite B
Santa Cruz, CA 95060

BID FROM:

(Print Name of firm submitting Proposal)

(Address)

(City, State, Zip Code)

(Telephone) (Fax)

(Email address)

Bidder's Declarations and Statement of Understanding

- 1) The Bidder declares that he/she has read the IFB and has authority to submit the following bid. The bidder understands that, in addition to this Bid Form, the IFB and bidder's supporting documentation constitute parts of the bid and are incorporated herein by reference. Bidder acknowledges that addenda numbers ____ through ____ have been delivered and have been taken into account as part of this bid, and that all addenda issued are hereby made part of the bid.
- 2) The Bidder declares that he/she understands that all portions of the Bid Form must be completed before the bid is submitted. Failure to do so may result in the bid being rejected as non-responsive. Attached to and submitted with the Bid Form, bidder must provide the following completed documents: Statement of Bidder's Qualifications, Experience, Financial Viability and Ability and Project Capacity, Non-Collusion Affidavit, Bidder's Bond or Security as required, Certification(s) regarding Disbarment for Prime Contracts over \$100,000.00, for subcontracts over \$100,000.00, and for subcontracts under \$100,000.00, Disclosure of Governmental Positions, Designation of Subcontractors, Buy America Certificate, Certification Regarding Lobbying, Disadvantaged Business Enterprise (DBE) Certification and Information Report, Statement of Compliance, Apprenticeship Employment Certification, Workers' Compensation Certification and Conflict of Interest Statement. Failure to submit all required documents completed may result in the bid being rejected as non-responsive.
- 3) The Bidder declares and agrees that it can and will meet the insurance requirements set forth in the IFB and all required insurance will be carried without reservation or exclusion should Bidder be awarded a contract pursuant to the IFB, during the entire term of the contract and any extensions thereof.
- 4) The bidder, having the appropriate active contractor's license (Class "A" or "B") required by the State of California; or able to obtain the appropriate license by the time of the award of the contract and having

II. BID FORM
Document 1

carefully read and examined the plans, specifications, and all related bidding documents as prepared by METRO for the construction of the MetroBase Project Phase 1, having carefully and fully examined the sites of the proposed work and all information available to bidder, and being familiar with all the conditions related to the proposed work, including the availability of materials, equipment, and labor, hereby offers to furnish all labor, materials, tools, transportation, services, and equipment necessary to complete the work of the described project in accordance with the IFB, and to complete all requirements of the IFB for the sums quoted in this Bid Form. The bidder agrees that it will not withdraw its bid within sixty (60) days after the bid submission deadline. If the bidder is selected as the apparent lowest responsive responsible bidder, the bidder agrees, within ten (10) working days after receipt of notice of award, to sign and deliver the Contract, and to furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and other required items to the Purchasing Agent at 110 Vernon Street, Suite B, Santa Cruz, California 95060. If awarded the Contract, the bidder agrees to complete the project within 974 calendar days after the date of the commencement specified in the Notice to Proceed.

- 5) The bidder agrees to perform the work for the combined cost of all items of work in the amount of:

_____ Dollars (\$ _____)
(In words-printed or typed)

- 6) Bidder represents warrants and agrees that if awarded the contract, bidder shall perform a minimum of _____
_____ (%) of the total of all work with its own forces.

There is herewith enclosed cash, a Bidder's Bond, or bid security for the benefit of, or a certified check or cashier's check made payable to, Santa Cruz Metropolitan Transit District in the amount of:

_____ Dollars (\$ _____)
(In words-printed or typed)

The bidder agrees that if the bidder is selected as the apparent lowest responsive responsible bidder whose bid is responsive, and the bidder fails to sign the Contract and/or furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and/or other required items within the time limit specified in the IFB, the Santa Cruz Metropolitan Transit District may award the work to another bidder or call for new bids. In such event, the bidder shall be liable to the Santa Cruz Metropolitan Transit District for the difference between the amount of the disqualified bid and the larger amount for which the Santa Cruz Metropolitan Transit District procures the work plus all of the Santa Cruz Metropolitan Transit District's costs, damages, expenses and liabilities arising from bidder's failure to sign the Contract and/or furnish the required documents.

BIDDER IS A: (circle one)

Corporation Partnership Individual Joint Venture Other _____

Federal Tax Number: _____

Business License Number: _____

What is the official name registered with the IRS for this number?

When were you organized? _____

If a Corporation, where incorporated? _____

How many years have you been in the contracting business under your current firm name or trade name? _____

**II. BID FORM
Document 1**

State the date bidder first began business _____

State any other names that bidder has used or done business under in the past five (5) years.

NAMES AND TITLES OF KEY MEMBERS OF FIRM: _____

(Name of person signing the bid on behalf of the bidder and all general partners, if a partnership, must be included.)

NAME OF PRESIDENT IF A CORPORATION: _____

NAME OF SECRETARY IF A CORPORATION: _____

STATE OF INCORPORATION: _____

CALIFORNIA CONTRACTOR'S LICENSE(S):

Contractor warrants that it either has the required license as indicated or will possess the required license at the time of the award.

Name of License(s):

Classification(s)	Number	Expiration Date
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(For Joint Ventures, list license or licenses for all Joint Venture partners.)

CORPORATE SEAL:

Identification of contact person during IFB process:

Name: _____

Address: _____

Telephone Number: _____

Fax Number: _____

E-Mail Address: _____

II. BID FORM
Document 1

Acceptance of Terms:

Execution of this Bid Form shall be deemed as acceptance of all the terms and conditions as set forth in the Notice and Invitation of Bids, including but not limited to the Instructions to Bidders (Part I), Bid Form (Part II), General Conditions of Contract (Part III), Special Conditions of Contract (Part IV), Contract (Part V), the FTA Requirements for construction contracts (Part VI), Volumes 2 and 3 of the IFB and the construction drawings.

NAME OF BIDDER'S FIRM:

Address: _____

By: _____
(Signature)

(Print)

By: _____
(Signature)

(Print)

(If signature is by other than the sole proprietor, general partner, or corporate officers, attach an original Power of Attorney.)

BID FORM – DOCUMENT 2

**STATEMENT OF BIDDER'S QUALIFICATIONS, EXPERIENCE,
FINANCIAL VIABILITY, AND ABILITY & PROJECT CAPACITY**

(Use Additional Sheets if necessary)

This form must be completed, signed by bidder, and submitted to the Santa Cruz Metropolitan Transit District with the bidder's submitted bid package or no later than 10:00 am on December 15, 2005. Failure to complete, sign and submit this document may result in bidder's submitted bid to be rejected as non-responsive.

The BIDDER is required to state below what work of similar magnitude or character it has completed, and to give a minimum of three (3) references that will enable METRO to judge its experience, skill and business standing and of his/her/its ability to construct the Project as completely and as rapidly as required under the terms of the IFB.

All questions must be answered and the data given must be clear and comprehensive. Provide the nature of the work performed, for whom, amount of contract, dates of work, and the name of architect, engineer, or other supervising person or public agency. **If necessary, questions may be answered on separate attached sheets.** The BIDDER may submit any additional information it believes is relevant to its qualifications and experience.

1. State the full legal name of the bidder.
2. State the name and title of each officer or other legal entity, which has a legal or equitable ownership of ten percent (10%) or more of the bidder. For each such person or legal entity, state that person or entity's ownership interest, and responsibilities, if any.
3. Has any person or legal entity holding a legal or equitable ownership of ten percent (10%) or more of the bidder, ever been accused of a civil violation of California Government Code Section 12650, et seq., (False Claims Act) or 31 United State Code Section 3729, et seq.? If so, describe in detail all facts, circumstances and the outcome.
4. Has any person or legal entity holding a legal or equitable ownership of ten percent (10%) or more of the bidder, ever been determined by a public agency to not be a responsible bidder? If so, state the name, address and telephone number of the public agency, including the name of the agency's contact person.
5. For every lawsuit or arbitration between bidder and the owner of construction project, limited to such lawsuits or arbitrations initiated or completed within the past seven (7) years, state the name and address of the tribunal, the matter number, the parties, a general description of the nature of the dispute, and the outcome, if any.
6. Within the past seven (7) years, has bidder paid liquidated damages, ever failed to complete a construction project, within the time allowed by the contract, including any agreed upon contract extensions? If so, state the name, address and telephone number of the owner of such construction project including the name of the agencies' contact person, and further, describe in detail the nature of the work of improvement.
7. Within the last seven (7) years has any surety of bidder ever paid or satisfied any claim against the bidder? If so, state all facts and circumstances, including the name, address and telephone number of surety and all claimants.
8. Has any surety of bidder ever been called upon to complete a project for the bidder? If so, state all facts and circumstances, including the name, address and telephone number of surety and all claimants.

BID FORM – DOCUMENT 2

9. For each construction project that bidder is either (a) currently furnishing labor, services, materials or goods, or (b) under contract to furnish labor, services, materials or goods, state: A general description of the project; the current status of the project and bidder's work thereon; the owner's name, address and telephone number; the amount of bidder's contract on such project and the scheduled completion date.
10. State bidder's annual gross income for each of the last five fiscal years.
11. Attach a current financial statement. As used herein, "current financial statement" means a balance sheet and profit and loss statement prepared and presented in a format that complies with Generally Accepted Accounting Principles (GAAP), covering a period of time that is no less than the most recent fiscal year for bidder. The current financial statement must be prepared by a Certified Public Accountant. If bidder's most recent fiscal year ended more than six (6) months prior to the date when the Contract Documents require this Contractor Qualification Questionnaire be completed and returned to Santa Cruz Metropolitan Transit District, then "current financial statement" shall also include an interim balance sheet and profit and loss statement covering the period of time from the end of bidder's most recent fiscal year to a period of time no greater than sixty (60) days prior to the date when the Contract Documents require this Bidder Qualification Questionnaire be completed and returned to Santa Cruz Metropolitan Transit District. Bidder's current financial statement must demonstrate Bidder's financial viability and financial ability to perform this Project and Bidder's other scheduled projects.
12. Describe the Organizational Structure of the proposed Project Team. If the Bidder is a Joint Venture than provide a copy of the Joint Venture agreement. Provide a description on any team agreements, the functions and organizational structure of each team member, including proposed major subcontractors and sub-consultants.
13. At a minimum to be responsible, you must meet the following criteria (Documentation must be attached setting forth the Name of Owner, Address, Contact Person, phone number, e-mail address of each project that Bidder claims meet the owner required criteria so that METRO can verify Bidder's experience.):
 - a. Have completed to the public owner's satisfaction, no less than three (3) public works projects in the State of California involving the construction of a building, each with an original contract price of no less than \$15,550,000.00, within the past seven (7) years, with at least one of the projects successfully completed within the last year prior to the date of bid opening. Each of the Projects must have required substantial work involving the bidder's own forces itself.
 - b. The General Contractor or subcontractor thereof shall have completed to the public owner's satisfaction, at least **two (2) public works** projects in the State of California of similar scope, size, and complexity of this project.
 - c. The proposed Project Manager shall have experience in management of construction, including at least five (5) years experience with significant responsibility on at least two (2) construction projects of similar scope, size, and complexity of this project.

BID FORM – DOCUMENT 2

THE FOLLOWING CERTIFICATION MUST BE SIGNED BY AN OWNER, GENERAL PARTNER, OR OFFICER OF BIDDER.

I DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA, AND DO PERSONALLY CERTIFY AND ATTEST THAT: I HAVE THOROUGHLY REVIEWED THE ATTACHED BIDDER QUALIFICATION QUESTIONNAIRE, AND KNOW ITS CONTENTS, AND CERTIFY THAT THE RESPONSES PROVIDED TO THE BIDDER QUALIFICATION QUESTIONNAIRE ARE TRUTHFUL, COMPLETE AND ACCURATE; AND THAT SANTA CRUZ METROPOLITAN TRANSIT DISTRICT MAY REASONABLY RELY UPON THE CONTENTS AS BEING COMPLETE AND ACCURATE; AND, FURTHER, THAT I AM FAMILIAR WITH CALIFORNIA PENAL CODE SECTION 72 AND CALIFORNIA GOVERNMENT CODE SECTION 12650, ET SEQ, PERTAINING TO FALSE CLAIMS, AND FURTHER KNOW AND UNDERSTAND THAT SUBMISSION OR CERTIFICATION OF A FALSE CLAIM MAY LEAD TO FINES, IMPRISONMENT AND/OR OTHER SEVERE LEGAL CONSEQUENCES. I FURTHER CERTIFY THAT BIDDER MEETS THE MINIMUM QUALIFICATION CRITERIA SET FORTH HEREIN.

Executed on the date indicated below, at the location indicated below.

Dated: _____

Bidder: _____
(Company's Name)

By: _____
(Signature)

(Printed name of signor)

(Title of signor)

BID FORM – DOCUMENT 3
NON-COLLUSION AFFIDAVIT

(TO BE SIGNED BY BIDDER AND SUBMITTED WITH BID)

Pursuant to Section 7106 of the Public Contract Code,

(Name)

being first duly sworn, deposes and says that he or she is

(Title)

of _____,
(Company Name)

the party making the foregoing bid; the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Signature

**BID FORM – DOCUMENT 4
BIDDER’S BOND**

That we _____ As PRINCIPAL and _____

_____ As SURETY, are held and firmly bound unto the Santa Cruz Metropolitan Transit District herein called “METRO” OR “DISTRICT” the sum of TEN (10) PERCENT OF THE TOTAL AMOUNT OF THE BID of the Principal named above, submitted by said Principal to **the** METRO for the work described below, for the payment of which lawful money of the United States of America, well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents. In no case shall the liability of the Surety hereunder exceed the sum of \$ _____.

THE CONDITION OF THIS OBLIGATION IS SUCH,

That whereas the Principal has submitted a Bid No. 06-01 for certain construction specifically described as follows, which is to be opened on OCTOBER 17, 2006 for Labor and materials to construct the MetroBase Project Phase 1 located in Santa Cruz, CA.

NOW, THEREFORE, if the aforesaid Principal is awarded a Contract, and within the time and manner required under the specifications, after the prescribed forms are presented to it for signature, enters into a written Contract, in the prescribed form in accordance with the Bid, and files two bonds with the METRO, one to guarantee faithful performance and the other to guarantee payment for labor and materials, then this obligation shall be null and void, otherwise, it shall be and remain in full force and effect.

In the event that the METRO brings suit upon this bond and judgment is recovered, the Surety shall pay all costs incurred by the METRO in such suit, including a reasonable attorney’s fee to be fixed by the court.

California law shall govern the interpretation of this bond.

To be considered complete, both the Bidder and an admitted Surety insurer authorized by the California Insurance Commissioner to transact surety business in the State of California must sign this Bidder’s bond. In addition, the Surety’s signature must be notarized and a copy of the Surety’s power of attorney must be attached.

In witness whereof, WE HAVE HEREUNTO SET OUR HANDS AND SEALS ON THIS _____ DAY OF _____, _____.

PRINCIPAL

BY

PRINCIPAL SEAL

SURETY

BY

SURETY SEAL

ADDRESS OF SURETY

[End of Bidders Bond.]

BID FORM – DOCUMENT 5

**CERTIFICATION OF PROPOSED CONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Prime Contracts totaling over \$100,000)

(Contractor) _____ certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Contractor) _____, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Signature and Title of Authorized Official

BID FORM – DOCUMENT 6

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling over \$100,000)

(Subcontractor) _____ certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) _____, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Signature and Title of Authorized Official

BID FORM – DOCUMENT 7

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling \$100,000 or less)

(Subcontractor) _____ certifies, by submission of this bid, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) _____, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Signature and Title of Authorized Official

**BUY AMERICA CERTIFICATE
BID FORM – DOCUMENT 10**

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323 (j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date _____

Signature _____

Company Name _____

Title _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

Certification requirement for procurement of buses, other rolling stock and associated equipment.

Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date _____

Signature _____

Company Name _____

Title _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

BID FORM – DOCUMENT 11
CERTIFICATION REGARDING LOBBYING

(To be submitted with each bid or offer exceeding \$100,000)

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person or making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions [as amended by “Government wide Guidance for New Restrictions on Lobbying,” 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. §1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understand and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.

_____ Signature of Contractor’s Authorized Official

_____ Name and Title of Contractor’s Authorized Official

_____ Date

**BID FORM – DOCUMENT 11
CERTIFICATION REGARDING LOBBYING**

DISCLOSURE FORM TO REPORT LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

1. Type of Federal Action: <input type="checkbox"/> a. Contract b. Grant c. Cooperative agreement d. Loan e. loan guarantee f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application b. initial award c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing b. material change For Material Change Only: Year _____ Quarter _____ Date of Last Report: _____
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, <i>if known</i> Congressional District, <i>if known</i> : _____		5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime: Congressional District, <i>if known</i> : _____
6. Federal Department/Agency: Federal Action Number, <i>if known</i> : _____		7. Federal Program Name/Description: CFDA Number, <i>If applicable</i>: _____ Award Amount, <i>if known</i> : \$ _____
10a. Name and Address of Lobbying Entity (last name, first name, MI): (attach continuation sheet(s) SF-LLL-A, <i>if necessary</i>)		b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI):
11. Amount of Payment (<i>check all that apply</i>): \$ _____ <input type="checkbox"/> Actual <input type="checkbox"/> Planned		13. Type of Payment (<i>check all that apply</i>): <input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other, specify: _____
12. Form of Payment (<i>check all that apply</i>): <input type="checkbox"/> Cash <input type="checkbox"/> in kind, specify nature Value _____		
14. Brief description of Services Performed and Date(s) of Service, Including officer(s), employee(s), or Members(s) contacted, for Payment Indicated in Item 11: (attach Continuation Sheet(s) SF-LLL-A, <i>if necessary</i>)		
15. Continuation Sheet(s) SF-LLL-A attached: <input type="checkbox"/> Yes <input type="checkbox"/> No		

**BID FORM – DOCUMENT 11
CERTIFICATION REGARDING LOBBYING**

<p>16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each failure.</p>	<p>Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____</p>	
<p>Federal Use Only:</p>		<p>Authorized for Local Reproduction Standard Form - LLL</p>

**BID FORM – DOCUMENT 13
STATEMENT OF COMPLIANCE**

Company Name

Street /Mailing Address

City/State/Zip Code

TAX I.D. _

1. PRIME CONTRACTOR

The Bidder/Proposer is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The Bidder/Proposer has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of application _____

The Bidder/Proposer is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

2. SUB-CONTRACTOR (if proposed in bid or proposal)

Attach a separate sheet for each sub-contractor to be used in the performance of services under a bid specifying the sub-contractor DBE status as stated under section I listed above.

If not already registered, sub-contractors should access the following web site: [http://www.dot.ca.gov/hq/bep/Roster of Certifying Agencies 09-16-03.doc](http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc) for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Prime Contractor's are requested to explain the DBE program and encourage sub contractors to apply for certification.

Prime Signature

Date

(Position/Title)

**BID FORM – DOCUMENT 13
STATEMENT OF COMPLIANCE**

(Company Name)

(hereinafter referred to as “Prospective Contractor”) hereby certifies that during the performance of this contract, contractor and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, disability, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et. seq.) and the applicable regulations promulgated thereunder (Cal. Admin. Code, Tit. 2, Section 7285.0 et. seq.) both of which are incorporated into this contract by reference and made a part hereof as if set forth in full. Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

I, _____
(Name of Official)

hereby swear that I am duly authorized to legally bind the Prospective Contractor to the above-described certification. I am fully aware that this certification, signed on

(Date)

in the County of _____, is made under the penalty of perjury
(County)

under the laws of the State of California.

(Signature)

(Print)

(Title)

**BID FORM – DOCUMENT 14
APPRENTICESHIP EMPLOYMENT CERTIFICATION**

APPRENTICESHIP

For each craft or trade utilized in performing the tasks required under this contract, each contractor or subcontractor performing work on this project shall employ apprentices on the project, in the ratios required by California statute, Section 1777.5 and 1777.6 of the Labor Code and the regulations of the California Apprenticeship Council, who are enrolled and participating in an apprenticeship program that has graduated apprentices annually for at least the past five (5) years. This requirement applies to any craft used on the project for which the State of California Department of Industrial Relations, Division of Apprenticeship Standards, has approved an apprenticeship program.

The graduation requirement for each of the preceding five (5) years shall not apply to any apprenticeship program not recognized or approved by the Department of Labor and/or Division of Apprenticeship Standards as an apprenticeable occupation for at least nine (9) years immediately prior to OCTOBER 17, 2006 providing that the program has graduated apprentices each year following the fifth anniversary of its recognition or approval.

In the event that there is no state-approved apprenticeship program that meets requirements of this provision for a particular craft or trade utilized under this contract for the MetroBase Project, the Contractor shall be exempt from the requirement of this provision for that craft or trade only.

APPRENTICESHIP EMPLOYMENT CERTIFICATION

Under the laws of the State of California, the undersigned declares, under penalty of perjury, compliance with the apprentice programs described in the Special Conditions for the workforce employed by Contractor or any subcontractor under the contract for Specification for the MetroBase Project.

Contractor: _____
By: _____
Date: _____
Title: _____

BID FORM – DOCUMENT 15
WORKERS' COMPENSATION CERTIFICATION

I, as the Contractor for the MetroBase Project, am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract, if I am selected as the Contractor.

Contractor: _____
By: _____
Date: _____
Title: _____

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

The Bidder certifies that:

1. The Bidder has not employed in connection with services to be performed by the Contract a current or former METRO employee who was directly or indirectly involved with this procurement;
2. The Bidder has not employed in connection with the services to be performed by the Contract a current or former employee of RNL who was directly or indirectly involved in the preparation of the specifications or this IFB;
3. The Bidder did not receive any confidential information in connection with the services to be performed by the Contract; and
4. The Bidder has not employed as a lobbyist any former METRO Board Member or employee who left the METRO within the last twelve (12) months.

The Bidder further certifies that it has set forth below the names of all current and former METRO persons identified including METRO Board Members, employees it has or intends to employ in connection with the services to be performed under the Contract.

Current and/or former METRO Board Members, alternatives, or employees:

_____	_____
_____	_____
_____	_____
_____	_____

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Executed on _____, 20____, at _____, _____
(Date) (City) (State)

_____	_____	_____
Typewritten or Printed Name	Signature of Authorized Official	Title

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

CONFLICT OF INTEREST CHECKLIST

All Bidders must respond to each of the following questions to determine whether any actual or perceived conflict of interest may exist. If any response has a “yes” answer, provide accurate and complete information for analysis.

1. Have you or any of your team member(s) or consultant(s) ever been employed by, or done work for, the METRO? Yes No

If your answer is “Yes”, please provide the additional information.

- | | | | |
|----------------------------|------------------------------|-----------------------------|----------------|
| • Full-time employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Part-time employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • As-Needed employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Consultant | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Or other, please explain | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |

-
- Dates of Employment/consulting contract:

-
- In which department(s) did you work?

-
- Who was your supervisor(s)/who did you supervise?

-
- Please describe your job duties and responsibilities or consulting work for each METRO position held:

-
- Last date of employment or consultant contract:

2. Are any METRO Board Member(s) or any of their staff presently serving as officers, partners, or shareholders in your company? Yes No

If the answer is “Yes”, please provide the additional information:

- Name(s) of Board Members:

-
- What is his/her position with your company?

-
- Percentage of ownership of company shares:

BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT

3. Are any of your former employee's or consultant's presently employed by the METRO? Yes No

If the answer is "Yes", please provide the additional information:

- Name(s) of each former employee:
-

- All titles of each former employee:
-

- Description of job duties:
-

- Dates of employment or date consultant worked for you:
-

4. In the preceding twelve months, has the Bidder/Proposer made, arranged or delivered any gift(s) to any METRO Board Member? Yes No

If the answer is "Yes", please provide the additional information:

- Name of Board Member receiving the gift:
-

- Value of the gift:
-

- Description of the gift:
-

- Date the gift was delivered:
-

5. In the preceding forty-eight (48) months, has your company made, arranged or delivered any campaign contributions to any METRO Board Member? Yes No

If the answer is "Yes", please provide the additional information:

- Name of Board Member receiving the contribution:
-

- Name of Board Member receiving contribution:
-

- Amount of the contribution:

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

-
- Description of form of contribution (i.e. cash, check):

-
- Date the contribution was delivered:

-
- To whom was the contribution delivered:
-

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Executed on _____, 20__, at _____, _____
(Date) (City) (State)

Typewritten or Printed Name

Signature of Authorized Official

Title

PART III
GENERAL CONDITIONS TO THE CONTRACT

I. GENERAL PROVISIONS

1.01 Governing Law & Compliance with All Laws

This Contract is governed by and construed in accordance with the laws of California. Each party will perform its obligations hereunder in accordance with all applicable laws, rules, and regulations now or hereafter in effect.

1.02 Right to Modify Contract

METRO may extend the term of this Contract, expand the Scope of Work, or otherwise amend the Contract. Any such extension, expansion or amendment shall be effective only upon written agreement of the parties in accordance with Section 13.14.

2. TERMINATION

2.01 Termination for Convenience

2.01.01 The performance of Work under this Contract may be terminated by the METRO upon fifteen (15) days' written notice at any time without cause for any reason in whole or in part, whenever the METRO determines that such termination is in the METRO's best interest.

2.01.02 Upon receipt of a notice of termination, and except as otherwise directed by the METRO, the Contractor shall: (1) stop work under the Contract on the date and to the extent specified in the notice of termination; (2) place no further orders or subcontracts for materials, services, or facilities, except as may be necessary for completion of such portion of the Work under the Contract as is not terminated; (3) terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination; (4) assign to the METRO in the manner, at the time, and to the extent directed by the METRO all of the rights, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the METRO shall have the right, at its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts; (5) settle all outstanding liabilities and claims arising out of such termination or orders and subcontracts, with the approval or ratification of the METRO, to the extent the METRO may require, which approval or ratification shall be final for all the purposes of this clause; (6) transfer title to the METRO and deliver in the manner, at the time, and to the extent, if any, directed by METRO the fabricated or unfabricated parts, work in progress, completed work, supplies and other material produced as a part of, or acquired in connection with the performance of, the work terminated and the completed or partially completed plans, drawings, information and other property which, if the Contract had been completed, would have been required to be furnished to the METRO; (7) use its best efforts to sell, in the manner, at the time, to the extent, and at the price(s) directed or authorized by the METRO, any property of the types referred to above provided, however, that the Contract shall not be required to extend credit to any purchaser, and may acquire any such property under the conditions prescribed by and at a price(s) approved by the METRO, and provided further, that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made to the METRO to the Contractor under this Contract or shall otherwise be credited to the price or cost of the Work covered by this Contract or paid in such other manner as the METRO may direct; (8) complete performance of such part of the Work as shall not have been terminated by the notice of termination; and (9) take such action as may be necessary, or as the METRO may

direct, for the protection or preservation of the property related to this Contract which is in the possession of the Contractor and in which the METRO has or may acquire an interest.

2.02 Termination for Default

- 2.02.01 If the Contractor should be in default and fails to remedy this default within ten (10) calendar days after receipt from METRO of such notice of default, METRO may terminate the contract, or such portion thereof, as METRO determines is most directly affected by the default. The term "default" for purposes of this provision includes, but is not limited to, the performance of work in violation of the terms of this contract; abandonment, assignment, or subletting of this contract without approval of METRO; bankruptcy or appointment of a receiver for Contractor's property/business; failure of Contractor to perform the services or other required acts within the time specified for this contract or any extension thereof; refusal or failure to provide proper workmanship; failure to make progress as to endanger performance of this contract in accordance with its provisions.
- 2.02.02 If the Contract is terminated in whole or in part for default, the METRO may procure, upon such terms and in such manner as the METRO may deem appropriate, supplies or services similar to those so terminated. Without limitation to any other remedy available to the METRO, the Contractor shall be liable to the METRO for any excess costs for such similar supplies or services, and shall continue the performance of this Contract to the extent not terminated under the provisions of this clause.
- 2.02.03 If, after notice of termination of this Contract under the default, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that the default was excusable under the provisions of this clause, the rights and obligations of Contractor and METRO shall be considered to have been terminated pursuant to termination for convenience of the METRO pursuant to Article 2.01 from the date of Notification of Default.

2.03 No Limitation

The rights and remedies of the METRO provided in this Article 2 shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

3. FORCE MAJEURE

3.01 General

Neither party hereto shall be deemed to be in default of any provision of this Contract, or for any failure in performance, resulting from acts or events beyond the reasonable control of such party. For purposes of this Contract, such acts shall include, but not be limited to, acts of God, civil or military authority, civil disturbance, war, strikes, fires, other catastrophes, or other "force majeure" events beyond the parties' reasonable control; provided, however, that the provisions of this Section 3 shall not preclude METRO from canceling or terminating this Contract (or any order for any product included herein), as otherwise permitted hereunder, regardless of any force majeure event occurring to Contractor.

3.02 Notification by Contractor

Contractor shall notify METRO in writing as soon as Contractor knows, or should reasonably know, that a force majeure event (as defined in Section 3.01) has occurred that will delay completion of the Scope of Work. Said notification shall include reasonable proofs required by the METRO to evaluate any Contractor request for relief under this Article 3. METRO shall examine Contractor's notification and determine if the Contractor is entitled to relief. The METRO shall notify the Contractor of its decision in writing. The METRO's decision regarding whether or not the Contractor is entitled to force majeure relief shall be final and binding on the parties.

3.03 Losses

Contractor is not entitled to damages, compensation, or reimbursement from the METRO for losses resulting from any "force majeure" event.

4. PROFESSIONAL STANDARDS

Contractor shall at all times during the term of this Contract possess the technical ability, experience, financial ability, overall expertise, and all other skills, licenses, and resources necessary to perform and complete the scope of work in a timely, professional manner so as to meet or exceed the provisions of this Contract. Contractor shall insure that each subcontractor working on the Project also has the requisite skill, experience, financial ability, overall expertise, resources and appropriate licenses as necessary so as to be able to perform the work required by the Contract.

5. PROFESSIONAL RELATIONS

5.01 Independent Contractor

No relationship of employer and employee is created by this Contract. In the performance of its work and duties, Contractor is at all times acting and performing as an independent contractor in the practice of its profession. METRO shall neither have nor exercise control or direction over the methods and means of all portions of the Work performed by Contractor (including, without limitation, its officers, shareholders, and employees); provided, however, that Contractor agrees that all work performed pursuant to this Contract shall be in strict accordance with currently approved methods and practices in its profession, and in accordance with this Contract. The sole interest of METRO is to ensure that such services are performed and rendered in a competent and cost effective manner. The Contractor shall be responsible for the professional quality, technical accuracy, completeness, and coordination of the Work, it being understood that the METRO will be relying upon such professional quality, accuracy, completeness, and coordination in the performance of the Work by Contractor.

5.02 Benefits

Contractor (including, without limitation, its officers, shareholders, subcontractors and employees) has no claim under this Contract or otherwise against the METRO for social security benefits, workers' compensation benefits, disability benefits, unemployment benefits, vacation pay, sick leave, or any other employee benefit of any kind.

6. INDEMNIFICATION FOR DAMAGES, TAXES AND CONTRIBUTIONS

6.01 Scope

Contractor shall exonerate, indemnify, defend, and hold harmless METRO (which for the purpose of Articles 6 and 7 shall include, without limitation, its officers, agents, employees and volunteers) from and against:

- 6.01.01 Any and all claims, demands, losses, damages, defense costs, or liability of any kind or nature which METRO may sustain or incur or which may be imposed upon it for injury to or death of persons, or damage to property as a result of, or arising out of, or in any manner connected with the Contractor's performance under the provisions of this Contract. Such indemnification includes any damage to the person(s) or property(ies) of Contractor and/or third persons.
- 6.01.02 Any and all Federal, state and local taxes, charges, fees, or contributions required to be paid with respect to Contractor, Contractor's officers, employees and agents engaged in the performance of this Contract (including, without limitation, unemployment insurance, social security, and payroll tax withholding).

7. INSURANCE

7.01 General

Contractor, at its sole cost and expense, for the full term of this Contract (and any extensions thereof), shall obtain and maintain at minimum all of the following insurance coverage. Such insurance coverage shall be primary coverage as respects METRO and any insurance or self-insurance maintained by METRO shall be excess of Contractor's insurance coverage and shall not contribute to it.

7.02 Types of Insurance and Minimum Limits

Contractor shall obtain and maintain during the term of this Contract:

- (1) Worker's Compensation (in accordance with California Labor Code §3700) and Employer's Liability Insurance in conformance with the laws of the State of California (not required for Contractor's subcontractors having no employees).
- (2) Contractor's vehicles used in the performance of this Contract, including owned, non-owned (e.g. owned by Contractor's employees), leased or hired vehicles, shall each be covered with Automobile Liability Insurance in the minimum amount of \$1,000,000.00 combined single limit per accident for bodily injury and property damage.
- (3) Contractor shall obtain and maintain Comprehensive General Liability Insurance coverage in the minimum amount of \$1,000,000.00 combined single limit, including bodily injury, personal injury, and property damage. Such insurance coverage shall include, without limitation:
 - (a) Contractual liability coverage adequate to meet the Contractor's indemnification obligations under this contract.
 - (b) Full Personal Injury coverage.
 - (c) Broad form Property Damage coverage.
 - (d) A cross-liability clause in favor of the METRO.
- (4) Contractor shall comply with all requirements related to the provision of Unemployment Insurance.

7.03 Other Insurance Provisions

- (1) As to all insurance coverage required herein, any deductible or self-insured retention exceeding \$5,000.00 shall be disclosed to and be subject to written approval by METRO.
- (2) If any insurance coverage required hereunder is provided on a "claims made" rather than "occurrence" form, Contractor shall maintain such insurance coverage for three (3) years after expiration of the term (and any extensions) of this Contract.
- (3) All required Automobile Liability Insurance and Comprehensive or Commercial General Liability Insurance shall contain the following endorsement as a part of each policy: "The Santa Cruz Metropolitan Transit METRO is hereby added as an additional insured as respects the operations of the named insured."
- (4) All the insurance required herein shall contain the following clause: "It is agreed that this insurance shall not be canceled until thirty (30) days after the METRO shall have been given written notice of such cancellation or reduction."
- (5) Contractor shall notify METRO in writing at least thirty (30) days in advance of any reduction in any insurance policy required under this Contract.

- (6) Contractor agrees to provide METRO at or before the effective date of this Contract with a certificate of insurance of the coverage required.

8. RESERVED

9. NO DISCRIMINATION

The Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or, sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR, Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as recipient deems appropriate.

10. DISADVANTAGED BUSINESS ENTERPRISES

- 10.01 The Board of Directors of the Santa Cruz Metropolitan Transit District has adopted a Disadvantaged Business Enterprise Policy to promote the participation of disadvantaged business enterprises (DBE's) in all areas of METRO contracting to the maximum extent practicable. Consistent with the DBE Policy, the Contractor shall take all necessary and reasonable steps to ensure that DBE firms have the maximum practicable opportunity to participate in the performance of this project and any subcontracting opportunities thereof.

11. PROMPT PAYMENT

11.01 Prompt Progress Payment to Subcontractors

The prime contractor or subcontractor shall pay to any subcontractor not later than 10-days of receipt of each progress payment, in accordance with the provision in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The 10-days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over 30-days may take place only for good cause and with the District's prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanctions, and other remedies of that Section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies, otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the contractor, deficient subcontractor performance, and/or noncompliance by a subcontractor. This clause applies to both DBE and non-DBE subcontractors.

11.02 Prompt Payment of Withheld Funds to Subcontractors

The District shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the District of the contract work and pay retainage to the prime contractor based on these acceptances. The prime contractor or subcontractor shall return all monies withheld in retention from all subcontractors within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the District. Any delay or postponement of payment may take place only for good cause and with the District's prior written approval. Any violation of these provisions shall subject the violating prime contractor to the penalties, sanctions, and other remedies specified in Section 7108.5 of the California Business Professions Code. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies, otherwise available to the contractor or subcontractor in the event of: a dispute involving late payment or nonpayment by the contractor; deficient subcontractor performance; and/or noncompliance by a subcontractor. This clause applies to both DBE and non-DBE subcontractors.

Prime subcontractors must include the prompt payment language of paragraph 1 in all subcontracts, regardless of subcontractor's DBE status. Failure of a prime contractor to uphold prompt payment requirements for subcontractors will result in District withholding reimbursement for completed work.

12. RESERVED

13. MISCELLANEOUS PROVISIONS

13.01 Successors and Assigns

The Contract shall inure to the benefit of, and be binding upon, the respective successors and assigns, if any, of the parties hereto, except that nothing contained in this Article shall be construed to permit any attempted assignment which would be unauthorized or void pursuant to any other provision of this Contract.

13.02 Survival of Rights and Obligations

In the event of termination, the rights and obligations of the parties, which by their nature survive termination of the services covered by this Contract shall remain in full force and effect after termination. Compensation and revenues due from one party to the other under this Contract shall be paid; loaned equipment and material shall be returned to their respective owners; the duty to maintain and allow inspection of books, accounts, records and data shall be extended as provided in Section 13.15; and the hold harmless agreement contained in Article 6 shall survive.

13.03 Limitation on METRO Liability

The METRO's liability is, in the aggregate, limited to the total amount payable under this Contract.

13.04 Drug and Alcohol Policy

Contractor shall comply with Federal Transit Administration's (FTA) drug and alcohol testing regulations, 49 CFR Parts 653 and 654. Contractor shall not use, possess, manufacture, or distribute alcohol or illegal drugs during the performance of the Contract, while on METRO premises or distribute same to METRO employees.

13.05 Publicity

Contractor agrees to submit to METRO all advertising, sales promotion, and other public matter relating to any service furnished by Contractor wherein the METRO's name is mentioned or language used from which the connection of METRO's name therewith may, within reason, be inferred or implied. Contractor further agrees not to publish or use any such advertising, sales promotion or publicity matter without the prior written consent of METRO.

13.06 Consent to Breach Not Waiver

No provision hereof shall be deemed waived and no breach excused, unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether express or implied, shall not constitute a consent to, waiver of, or excuse for any other different or subsequent breach.

13.07 Attorneys' Fees

In the event that suit is brought to enforce or interpret any part of this Contract, the prevailing party shall be entitled to recover as an element of its costs of suit, and not as damages, a reasonable attorney's fee to be fixed by the court. The "prevailing party" shall be the party who is entitled to recover its costs of suit, whether or not the suit proceeds to final judgment. A party not entitled to recover its costs shall

not recover attorney's fees. No sum for attorney's fees shall be counted in calculating the amount of a judgment for purposes of determining whether a party is entitled to recover its costs or attorney's fees.

13.08 No Conflict of Interest

Contractor represents that it currently has no interest, and shall not have any interest, direct or indirect, that would conflict in any manner with the performance of services required under this Contract.

13.09 Prohibition of Discrimination against Qualified Handicapped Persons

Contractor shall comply with the provisions of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, as amended, pertaining to the prohibition of discrimination against qualified handicapped persons in federally-assisted programs.

13.10 Cal OSHA/Hazardous Substances

13.10.01 Contractor shall comply with California Administrative Code Title 8, Section 5194, and shall directly (1) inform its employees of the hazardous substances they may be exposed to while performing their work on METRO property, (2) ensure that its employees take appropriate protective measures, and (3) provide the METRO's Manager of Facility Maintenance with a Material Safety Data Sheet (MSDS) for all hazardous substances to be used on METRO property.

13.10.02 Contractor shall comply with Cal OSHA regulations and the Hazardous Substance Training and Information Act. Further, said parties shall indemnify the METRO against any and all damage, loss, and injury resulting from non-compliance with this Article.

13.10.03 Contractor will comply with the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) California Health and Safety Code Section 25249.5 - 25249.13. Contractor will ensure that clear and reasonable warnings are made to persons exposed to those chemicals listed by the State of California as being known to cause cancer or reproductive toxicity.

13.10.04 Contractor shall be solely responsible for any hazardous material, substance or chemical released or threatened release caused or contributed to by Contractor. Contractor shall be solely responsible for all clean-up efforts and costs.

13.11 Non-Assignment of Contract

The Contractor shall not assign, transfer, convey, sublet, or otherwise dispose of the Contract or Contractor's right, title or interest in or to the same or any part thereof without previous written consent by the METRO; and any such action by Contractor without METRO's previous written consent shall be void.

13.12 No Subcontract

Contractor shall not permit anyone other than Contractor or its authorized staff and subcontractors to perform any of the scope of work, services or other performance required of Contractor under this Contract without the prior written consent of the METRO. Any such action by Contractor without METRO's previous consent shall be void.

13.13 Severability

If any provision of this Contract is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall continue in full force and effect, and shall in no way be affected, impaired or invalidated.

13.14 All Amendments in Writing

No amendment to this Contract shall be effective unless it is in writing and signed by duly authorized representatives of both parties.

13.15 Audit

This Contract is subject to audit by Federal, State, or METRO personnel or their representatives at no cost for a period of four (4) years after the date of expiration or termination of the Contract. Requests for audits shall be made in writing, and Contractor shall respond with all information requested within ten (10) calendar days of the date of the request. During the four-year period that the Contract is subject to audit, Contractor shall maintain detailed records substantiating all costs and expenses billed against the Contract.

13.16 Smoking Prohibited

Contractor, its employees, subcontractors and agents shall not smoke on METRO premises, while performing the work required, or in a METRO vehicle.

13.17 Responsibility for Equipment

13.17.01 METRO shall not be responsible nor held liable for any damage to person or property consequent upon the use, or misuse, or failure of any equipment used by Contractor, or any of its employees, even though such equipment be furnished, rented or loaned to Contractor by METRO.

13.17.02 Contractor is responsible to return to the METRO in good condition any equipment, including keys, issued to it by the METRO pursuant to this Agreement. If the contractor fails or refuses to return METRO-issued equipment within five days of the conclusion of the contract work the METRO shall deduct the actual costs to repair or replace the equipment not returned from the final payment owed to contractor or take other appropriate legal action at the discretion of the METRO.

13.18 Grant Contracts

13.18.01 Contractor shall ensure throughout the terms of this Agreement that all federal, state and local laws and requirements are met including any requirements METRO is obligated to perform because of receipt of grant funding. Contractor shall also be required to fulfill its obligation as a federal and/or state and/or local sub-recipient of grant funding.

13.19 Time of the Essence

Time is of the essence in this Contract.

13.20 Unfair Business Practice Claims

In entering into this contract, the contractor offers and agrees to assign to METRO all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. §15 et seq.) or under the Cartwright Act (Business and professions Code §16700 et seq.) arising from the purchase of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time METRO tenders final payment to the contractor without further acknowledgment by the parties.

13.21 Nondiscrimination

During the performance of this contract, Contractor and subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical disability, medical condition, marital status, pregnancy, age (over 18), sex, sexual orientation, veteran's status or any other non-merit factor. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code Section 12900 et seq.) and the applicable regulations promulgated hereunder (Cal. Admin. Code, Title 2, Section 7285.0 et seq.). the applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990, set forth in Chapter 5 of Division 4 of Title 2 of the California Administrative Code are incorporated into this contract by reference and are made a part hereof as if set forth in full. Contractors and subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

Contractor shall include the nondiscrimination and compliance provisions of this section in all subcontracts to perform work under the Contract.

PART IV
SPECIAL CONDITIONS OF THE CONTRACT

1. BASIC SCOPE OF WORK

1.01 Basic Scope of Work

Contractor shall, without limitation, construct the MetroBase Vehicle Maintenance Building and Related Site Work in accordance with the "Specifications" section of the Invitation for Bids, dated AUGUST 22, 2006.

2. DEFINITIONS

2.01 General

The terms (or pronouns in place of them) have the following meaning in the Contract.

2.01.01 ACCEPTANCE DATE - The date on which MetroBase Vehicle Maintenance Building and Related Site Work is deemed to be complete in accordance with the provisions of the Contract and accepted in writing by the METRO.

2.01.02 CONTRACT - The Contract consists of this document, the attachments incorporated herein in accordance with Article 2 of Part VI - "Contract for ITEM," and any written amendments made in accordance with Article 13.14 of Part IV - "General Conditions of the Contract".

2.01.03 CONTRACTOR – The entity entering into a contract/agreement and synonymous with Bidder.

2.01.04 DAYS - Calendar Days unless specifically noted otherwise

2.01.05 PROVISION - Any term, agreement, covenant, condition, clause, qualification, restriction, reservation, or other stipulation in the Contract that defines or otherwise controls, establishes, or limits the performance required or permitted by either party.

2.01.06 SCOPE OF WORK (OR "WORK") - The entire obligation under the Contract, including, without limitation, all labor, equipment, materials, supplies, transportation, services, supervision, freight and other work products and expenses, express or implied, in the Contract.

3. LIQUIDATED DAMAGES

The contractor agrees to complete all of its work required in the Contract Documents, or any subsequent revisions or modifications thereto, within the time specified in the bid form, subject to Change Orders increasing or decreasing the time specified. It is agreed by the parties to this Contract that time is of the essence to the performance of this Contract by Contractor, and that in case the work called for under the Contract is not completed in all respects and requirements within the time called for in the Contract Documents, plus any agreed upon extensions of time, damages will be sustained by the METRO. If Contractor is delayed by certain specified causes that are beyond Contractor's control (e.g., weather, strikes, natural disasters) then the resulting delay is excused and liquidated damages will not be assessed. Contractor further agrees that it is and will be impracticable to determine the actual amount of damage by reason of such delay; and the Contractor agrees that the sum set forth within these Contract Documents is a reasonable amount to be charged as liquidated damages; and it is therefore agreed that the Contractor will pay to the METRO the sum of \$1,000 for Liquidated Damages for each consecutive calendar day's delay beyond the time prescribed in the Contract for completion as set forth below for each project sequence identified herein that is not completed as scheduled; and Contractor further agrees that the METRO may deduct and retain the amount thereof from any monies due the Contractor under the Contract:

The Contractor is put on notice that funding for this project is time sensitive with regard to the completion date. Delays shall be made up for by overtime work to maintain the scheduling. Any additional costs for overtime work to maintain the scheduled completion date shall be borne by the Contractor.

The Work shall be regarded as completed upon the date the METRO has accepted the same in writing.

4. STATE CONTRACT PROVISIONS

- 4.01 In the performance of work under these provisions, Contractor and its subcontractors will not discriminate against any of its employees or applicants for employment because of race, religious creed, medical condition, color, marital status, ancestry, sex, age, national origin, or physical handicap (Government Code Section 12940 et seq.). Contractor and all its subcontractors will take affirmative action to ensure that its applicants are employed, and that employees are treated during employment, without regard to their race, religious creed, medical condition, color, marital status, ancestry, sex, age, national origin, or physical handicap. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor and its subcontractors shall post in conspicuous places, available to employees and applicants for employment, notice to be provided by the State of California setting forth the provisions of this section. Contractor must include this language in each of its subcontracts.
- 4.02 Contractor and its subcontractors will permit access to all records of employment, employment advertisements, application forms, and other pertinent data and records by the State Fair Employment Practices and Housing Commission, or any other agency of the State of California designated by STATE, for the purpose of investigation to ascertain compliance with Section 1 of this Article.
- 4.03 Contractor shall establish and maintain an accounting system and records that properly accumulate and segregate incurred costs by line item for the project. Contractor's accounting system shall conform to generally accepted accounting principles (GAAP), enable to determination of incurred costs at interim points of completion, and provide support for reimbursement payment vouchers or invoices. All accounting records and other supporting papers of Contractor connected with performance under this Agreement shall be maintained for a minimum of three years from the date of final payment to METRO under these provisions and shall be held open to inspection and audit by representatives of STATE and the Auditor General of the State and copies thereof will be furnished upon request.
- 4.04 Contractor agrees that contract cost principles at least as restrictive as 48 CFR, Federal Acquisition Regulation System, Chapter 1 Part 31, shall be used to determine the allowability of individual items of costs. Contractor also agrees to comply with Federal procedures as set forth in 49 CFR, Part 18, Uniform Administrative Requirements for Grants-in-Aid to State and Local Governments.
- 4.05 For the purpose of determining compliance with Public Contract Code Section 10115, et seq., Military and Veterans Code Sections 999 et seq. and Title 2, California Code of Regulations, Section 1896.60 et seq., when applicable, and other matters connected with the performance of METRO's contracts with third parties pursuant to Government code Section 10532, Contractors and subcontractors shall maintain all books, documents, papers, accounting records, and other evidence pertaining to the performance of such contracts, including but not limited to, the costs of administering the various contracts. Contractor and its subcontractors shall make such materials available at their respective offices at all reasonable times during the contract period and for three years from the date of final payment under such contract. STATE, the State Auditor General, the Federal Highway Administration, or any duly authorized representative of the Federal Government shall have access to any books, records and documents that are pertinent to the Agreement for audits, examinations, excerpts, and transactions and copies thereof shall be furnished if requested.
- 4.06 Contractor must maintain certified payroll records in compliance with Labor Code §1776. At a minimum, the certified payroll records must show the name, address, social security number, work classification, straight time and overtime hours worked each day and week and the actual per diem wages paid to each worker. The Contractor and each of Contractor's subcontractors must certify the accuracy of the records and must make the records available for inspection at all reasonable hours. The public may inspect the records but only after the worker's name, address and social security number are removed.

5. RESERVED

6. NOTICE TO PROCEED

As soon as practicable after execution of the contract, and after receipt of acceptable insurance certificates and the payment and performance bonds by METRO, a written Notice to Proceed will be mailed to the Contractor. The effective date of the Notice to Proceed will be the date stated as such in the Notice, provided that the effective date will not be earlier than 10 days following the issuance of the Notice to Proceed.

7. DIFFERING SITE CONDITIONS

The contractor shall promptly, and before such conditions are disturbed, notify METRO in writing of: (1) material the contractor believes may be hazardous waste as defined in California Health and Safety Code Section 25117, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law; (2) subsurface or latent physical conditions at the site differing materially from those indicated in this contract; or (3) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided in this contract.

METRO will promptly investigate the condition and if it finds that the conditions do materially so differ, or do involve regulated material, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, METRO will issue a change order under the procedures described in this Contract. For regulated materials, METRO reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing regulated material from such areas.

In the event that a dispute arises between METRO and the Contractor on whether the conditions materially differ or on the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by this Contract but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by this Contract or by law, which pertain to the resolution of disputes and protests between the contracting parties.

8. PERMITS AND LICENSES

- 8.01 To the extent permit and licensing requirements are applicable, the contractor shall procure all permits and licenses not procured by METRO and required by the project, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work. As a matter of bidder responsibility, bidders shall be properly licensed in accordance with the laws of the State of California at the time of contract execution.
- 8.02 Attention is directed to the provisions of Chapter 9 of Division 3 of the California Business and Professions Code concerning the licensing of contractors. Contractors are required by law to be licensed and regulated by the Contractors' State License Board. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 1020 N Street, Sacramento, California 95814. (Business and Professions Code Section 7030). Any bidder or contractor not licensed in accordance with the laws of the State of California is subject to the penalties imposed by such laws.
- 8.03 Approvals and certificates of inspection for the work shall be submitted to METRO's construction manager at the completion of the project, prior to final payment.

9. CODES, REGULATIONS AND LAWS

- 9.01 All work performed under these Specifications shall be in strict accordance with all Federal, State, and Local codes, ordinances, rules, and regulations of all public administrative authorities having jurisdiction over this work.
- 9.02 The bidder shall inform METRO's Construction Manager of all discrepancies that are observed between these codes, laws, ordinances, and regulations, and the specifications and drawings pertaining to this work, in writing, prior to bid. The bidder shall include in his bid price, any labor, materials, service, apparatus, and drawings necessary to be performed in order to comply with all these codes, laws, ordinances, and regulations as if therein specified or shown.
- 9.03 All materials and supplies furnished pursuant to the specifications shall be in compliance with all

federal and state laws and applicable local regulations and ordinances. Contractor shall, if requested by METRO, provide certification and evidence of such compliance.

10. INTERFERENCE WITH BUSINESS OPERATIONS

Contractor shall not interfere with normal operation of METRO's facilities or equipment or the work of any other contractors. When the contractor anticipates unavoidable interference, it shall notify METRO in advance. METRO will determine whether such interference is unavoidable and will, if required, establish the necessary procedures under which the interference will be allowed. METRO shall have final determination of the priorities in case of conflicts with operations of others. Contractor shall not operate any of METRO's equipment or systems or those of any other contractor or subcontractor except at the direction and under the immediate supervision of METRO.

11. USE OF PREMISES

- 11.01 Work shall be scheduled in such a manner as to minimize disruption of on-going work and activities of METRO's employees and contractors. The Contractor is responsible for safety and security precautions during the project to minimize risk of injury or theft.
- 11.02 Work to be completed during regular working hours Monday through Friday from 7 a.m. to 5 p.m. The Project Manager must authorize work after-hours or on weekends. Contractor to comply with the City of Santa Cruz noise ordinance.
- 11.03 The Contractor shall not allow debris or waste materials to accumulate; regular periodic removals shall be made to keep premises and buildings in orderly appearance during the performance of work.
- 11.04 Contractor, after completion of the work and prior to final inspection and acceptance by METRO, shall thoroughly clean all work areas from dirt, stains, soiling, or defacement of any kind.
- 11.05 METRO's Construction Manager shall designate specific areas and times for delivery and unloading of construction materials and equipment. The Contractor shall not park vehicles or equipment, or unload materials, at any area other than designated areas without the prior approval of METRO's Construction Manager.

12. SAFETY OF PERSONNEL ON THE JOB SITE

- 12.01 The Contractor shall provide, erect, and maintain all such temporary work as may be required for the protection of the public and those employed on or about the property, including temporary fences, sidewalks, trench plates, guard rails around openings, barricades, and temporary lighting.
- 12.02 METRO's Construction Manager for the project must receive a written incident report for any serious accidents or unsafe conditions that exist.
- 12.03 The Contractor is responsible for its employee safety and training requirements mandated by Cal-OSHA including but not limited to the following; Lock out-Tag out, Right to Know (M.S.D.S.), Hazard Communication Plan, Personal Protective Equipment (P.P.E), Confined Spaces, and shoring of open trenches.

13. DEMOLITION

- 13.01 The contractor is responsible for demolition, removal, and proper disposal of existing materials. After the project is complete all construction debris shall be removed from the site. The waste disposal shall be in compliance with the Waste Reduction and Recycling Plan (WRRP) of City of Santa Cruz and the County of Santa Cruz. Contractor is also responsible for completing and submitting the Construction and Demolition Debris Recycling Report to the appropriate building inspector. To view this plan go to: <http://www.ci.santa-cruz.ca.us/pw/operationsrr.html>
- 13.02 Contractor shall be solely responsible for all safety, dust and noise control for work completed under this heading.

14. CONTRACTOR PERSONNEL

The Contractor shall designate, in writing before starting work, a qualified, responsive, and responsible Project Superintendent who shall have complete authority to represent and act for the Contractor. Said authorized representative of the Contractor shall normally be present at the site of the work at all times while work is actually in progress on the Contract to coordinate all construction activities with the key persons in charge of METRO's facilities to ensure as few interruptions as possible. This contractor's Project Superintendent must have experience in construction of this type and other similar projects.

During any period when work is suspended, arrangements acceptable to the Construction Manager shall be made for any emergency work that may be required.

Whenever the Contractor or an authorized representative is not present on any part of the work where it may be desired to give direction, orders will be given by the Construction Manager, which shall be received and obeyed by the superintendent who may have charge of the particular work in reference to which the orders are given. Any order given by the Construction Manager, not otherwise required by the Specifications to be in writing, will, on request of the Contractor, be given or confirmed by the Construction Manager in writing.

The Contractor shall designate, in writing, the names and telephone numbers of at least three representatives who could be contacted at any time in the event that an emergency occurs.

Any subcontractor, or person employed by the Contractor or subcontractor, who fails or refuses to carry out the directions of the Engineer, or appears to the Engineer to be incompetent or to act in a disorderly or improper manner, shall be removed from the work immediately on the written request of the Engineer, and such person shall not again be employed on the work.

15. FILING OF PLANS

Contractor shall be responsible for filing all necessary drawings and plans with other Government and private authorities with jurisdiction, such as utility companies, if their approval is required and/or as otherwise directed by METRO.

16. RESOLUTION OF CLAIMS

16.01 Claims Exceeding \$375,000

16.01.01 In case any disagreement, difference, or controversy shall arise between the parties, with respect to any matter in relation to or arising out of or under this Contract or the respective rights and liabilities of the parties, and the parties to the controversy cannot mutually agree thereon, and if the value exceeds \$375,000 then such disagreement, difference, or controversy shall be determined by binding arbitration, according to the provisions of Section 1282, et seq. of the California Code of Civil Procedure except CCP §1283.05(e). Any arbitrator appointed or selected shall be experienced in construction law.

16.01.02 Any award made by the Arbitrator(s) shall be final, binding, and conclusive upon all parties and those claiming under them. The costs and expenses of any Arbitration shall be borne and paid, as the Arbitrator(s) shall, by their award, direct.

16.01.03 The submission to Arbitration is hereby made a condition precedent to the institution of any action at law or in equity with respect to disputes arising under the contract; and such action at law or in equity shall be restricted solely to the subject matter of the challenge of such award on the grounds and in the manner permitted by law.

16.02 Claims up to \$375,000

Claims up to \$375,000 are subject to the provisions of Public Contract Code Sections 20104-20104.6. For claims subject to these statutory provisions, the following procedures apply:

16.02.01 Claims under \$50,000

For claims of fifty thousand dollars (\$50,000) or less, METRO shall respond in writing to any written claim within forty-five (45) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims METRO may have against the contractor.

16.02.02 If additional information is thereafter required, it shall be requested and provided pursuant to this provision, upon mutual agreement of METRO and the contractor.

16.02.03 METRO's written response to the claim, as further documented, shall be submitted to the contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the contractor in producing the additional information, whichever is greater.

16.03 Claims over \$50,000

16.03.01 For claims over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), METRO shall respond in writing to all written claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims METRO may have against the Contractor.

16.03.02 If additional information is thereafter required, it shall be requested and provided pursuant to this provision, upon mutual agreement of METRO and the Contractor.

16.03.03 METRO's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

16.03.04 If the Contractor disputes METRO's written response, or METRO fails to respond within the time prescribed, the Contractor may so notify METRO, in writing, either within fifteen (15) days of receipt of METRO's response or within fifteen (15) days of METRO's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, METRO shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

16.03.05 Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the Contractor submits their written claim until the time the claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

16.04 This section does not apply to tort claims nor shall it be construed to change the time periods for filing tort claims under the California Government Code.

16.05 Public Contract Code Section 20104.4, which is incorporated herein as if fully set forth, establishes procedures for civil actions filed to resolve claims subject to this section and are mandatory for all claims up to \$375,000.00. These procedures include mandatory submission of the matter to non-binding mediation followed, if necessary, by mandatory submission to judicial arbitration.

16.06 Continuance of Work

Disagreement by the Contractor with METRO's determination of the need for, or amount of, an adjustment in the contract price or contract time associated with an approved

Contract Change Order (or disagreement with METRO's determination that a change has not occurred and no Contract Change Order is needed), or the pendency of a dispute over a condition or term of the contract shall not relieve the Contractor from its obligation to promptly begin and diligently prosecute the work, including the change as described in the approved Contract Change Order, unless a cessation of work is ordered by METRO.

17. RESERVED

18. PRESERVATION AND CLEANING

The contractor shall clean up the work area at frequent intervals and at other times when directed by METRO. Before final inspection of the work, the contractor shall clean the project site, and surrounding areas impacted by the work. All parts of the work area shall be left in a neat and presentable condition. Final cleaning shall include washing, dusting and sweeping, as needed. Final cleanup will be considered as included in the contract price.

19. COMPLETION OF WORK

When the contractor considers the work to be complete, the contractor shall notify METRO in writing and request that METRO issues a Certificate of Completion. METRO shall make an inspection to determine if the work is complete in accordance with the contract documents. If METRO does not consider the work complete, METRO shall notify the contractor in writing stating the reasons thereof. METRO shall convene a meeting to discuss the findings and the parties shall reach a mutual agreement on the resolution of the outstanding issues and a time frame in which corrective action will be taken to complete the work.

20. FAILURE TO MEET CONTRACT REQUIREMENTS

When the contractor fails to meet requirements of the contract, the product or service may be bought from any source by METRO; and, if a greater price than that named in the contract is paid by METRO, the excess price will be charged and collected from the contractor or sureties on its bond.

21. RISK OF LOSS OR DAMAGE

All loss or damage arising from any unforeseen obstruction or difficulty, either natural or artificial, which may be encountered in the prosecution of the work, or the furnishing of supplies, material, or equipment, or from any action of the elements prior to the delivery of the work, supplies, materials or equipment, or from any act or omission not authorized by under the contract, shall be sustained by the contractor.

22. FINAL APPROVAL

22.01 Upon written notification by the Contractor that his work is completed and ready for acceptance, inspections and tests shall be performed by the Contractor as directed by, and in the presence of METRO's Representative.

22.02 Contractor shall furnish METRO with certificates of approval and any manufacturer warranties with the application for final payment.

22.03 All pre-final and final punch list items must be completed.

22.04 The following performance evaluation shall be performed by METRO:

22.04.01 Verification of materials to be used.

22.04.02 Verification of proper construction procedures.

22.04.03 Verify proper construction.

22.04.04 Copies of all Lien Releases or Waivers from all Sub-Contractors.

23. WARRANTY

Workmanship of Contractor and/or Sub-Contractors shall be warranted free of defects in materials and workmanship for one (1) year from the date of final acceptance by METRO.

24. SHIPPING CHARGES

All prices shall include freight FOB to the designated delivery point. METRO will reject requests for additional compensation for freight charges unless it has requested expedited delivery.

25. TAXES

The supplies, materials, or equipment called for under the specifications will be used by METRO in the performance of a governmental function and are exempt from taxation by the United States Government. METRO will, if requested, furnish a tax exemption certificate, and any and all affidavits and documents that may be necessary to establish such exemption.

PART V

CONTRACT FOR CONSTRUCTION OF METROBASE FUELING AND SERVICING FACILITY AND RELATED SITE WORK No. 06-01

THIS CONTRACT is made effective on _____, 2005 between the SANTA CRUZ METROPOLITAN TRANSIT DISTRICT, a political subdivision of the State of California ("METRO"), and _____ ("Contractor").

1. RECITALS

1.01 METRO's Primary Objective

METRO is a public entity whose primary objective is providing public transportation and has its principal office at 370 Encinal Street, Suite 100, Santa Cruz, California 95060.

1.02 METRO's Need for Construction of MetroBase Vehicle Maintenance Building and Related Site Work

METRO requires the construction of MetroBase Vehicle Maintenance Building and Related Site Work. In order to obtain said construction of MetroBase Vehicle Maintenance Building and Related Site Work, the METRO issued an Invitation for Bids, dated AUGUST 22, 2006 setting forth specifications for such construction of MetroBase Vehicle Maintenance Building and Related Site Work. The Invitation for Bids is attached hereto and incorporated herein by reference as Exhibit A.

1.03 Contractor's Bid Form

Contractor is a licensed general contractor desired by the METRO and whose principal place of business is _____. Pursuant to the Invitation for Bids by the METRO, Contractor submitted a bid for Provision of said construction of MetroBase Vehicle Maintenance Building and Related Site Work, which is attached hereto and incorporated herein by reference as Exhibit B.

1.04 Selection of Contractor and Intent of Contract

On _____, METRO selected Contractor as the lowest responsive, responsible bidder to provide said construction of MetroBase Vehicle Maintenance Building and Related Site Work. The purpose of this Contract is to set forth the provisions of this procurement.

1.05 Contractor and Supplier Synonymous

For the purposes of this Contract, the terms "contractor" and "supplier" are synonymous.

METRO and Contractor agree as follows:

2. INCORPORATED DOCUMENTS AND APPLICABLE LAW

2.01 Documents Incorporated in This Contract

The documents below are attached to this Contract and by reference made a part hereof. This is an integrated Contract. This writing constitutes the final expression of the parties' Contract, and it is a complete and exclusive statement of the provisions of that Contract, except for written amendments, if any, made after the date of this Contract in accordance with Part III, Section 13.14 of the General Conditions of the Contract.

a) Exhibit A

Santa Cruz Metropolitan Transit District's "Invitation for Bids No. 06-01" dated AUGUST 22, 2006 (3 volumes).

b) Exhibit B (Bid Form)

Contractor's Submitted Bid to METRO for the construction of the MetroBase Project, Phase 1 as signed by Contractor.

2.02 Conflicts

Refer to PART I, Item 1.03, item B.

2.03 Recitals

The Recitals set forth in Article 1 are part of this Contract.

3. TIME OF PERFORMANCE

3.01 General

The work under this Contract shall be completed 365 calendar days after the date of commencement specified in the Notice to Proceed, unless modified by the parties under Part III, section 13.14 of the General Conditions, Instructions and Information for Bidders of this Contract or terminated pursuant to Part III, section 2.

3.02 Term

The term of this Contract commences on the date of execution and shall remain in force for 365 calendar days after the date of commencement specified in the Notice to Proceed. METRO and Contractor may extend the term of this Contract at any time for any reason upon mutual written consent.

3.03 Acceptance of Terms

Execution of this documents shall be deemed as acceptance of all of the terms and conditions as set forth herein and those contained in the Notice and Invitation to Bidders, the General Conditions, the Special Conditions, the FTA Requirements for Construction Contracts, the Specifications and all attachments and addenda, which are incorporated herein by reference as integral parts of this Contract

4. SCOPE OF WORK

4.01

Contractor shall furnish METRO all supervision, labor, equipment, supplies, material, freight, transportation, tools and other work and services as specified in and in full accordance with the Invitation for Bid (IFB) No. 06-01 dated AUGUST 22, 2006 for the construction of the MetroBase Project Phase 1. The Contractor shall provide a complete project in conformance with the intent shown on the drawings and specified herein and as provided for and set forth in the IFB.

4.02

Contractor and METRO agree to comply with and fulfill all obligations, promises, covenants and conditions imposed upon each of them in the Contract Documents. All of said work done under this Contract shall be performed to the satisfaction of METRO or its representative, who shall have the right to reject any and all materials and supplies furnished by Contractor which do not strictly comply with the requirements contained herein, together with the right to require Contractor to replace any and all work furnished by Contractor which shall not either in workmanship or material be in strict accordance with the contract documents.

5. COMPENSATION

5.01 Terms of Payment

Upon written acceptance, METRO agrees to pay Contractor _____ as identified in the

Bid Form, Exhibit B, not to exceed \$ _____, for satisfactory completion of all work, including all costs for labor, materials, tools, equipment, services, freight, insurance, overhead, profit and all other costs incidental to the performance of the services specified under this contract, under the terms and provisions of this Contract within forty-five (45) days thereof. Contractor understands and agrees that if he/she exceeds the \$ _____ maximum amount payable under this contract, that it does so at its own risk.

5.02 Release of Claims

Payment by METRO of undisputed contract amounts is contingent upon the Contractor furnishing METRO with a Release of All Claims against METRO arising by virtue of the part of the contract related to those amounts.

5.03 Retention of progress payments

METRO will retain ten (10%) percent of the contract price from each progress payment made pursuant to the construction contract through the completion of the contract. The retention shall be released, with the exception of 150 percent (150%) of any disputed amount within 60 days after the date of completion of the work. Pursuant to Section 22300 of the Public Contract Code, the Contractor may substitute a deposit of securities in lieu of METRO withholding any monies to ensure Contractor's performance under the Contract, or alternatively, request that METRO make payment of retentions earned directly to an escrow agent at the expense of Contractor. The provisions of Public Contract Code Section 22300 are incorporated herein by reference as though set forth in full, and shall govern the substitution of securities and/or escrow account. If a Stop Notice is filed METRO will retain 125% of the amount set forth in the Stop Notice from the next progress payment made to Contractor.

5.04 Change in Contract Price

5.04.01. General

- A. The Contract price constitutes the total compensation payable to the Contractor for performing the work. All duties, responsibilities, and obligations assigned to or undertaken by the Contractor to perform the work shall be at the Contractor's expense without change in the Contract price.
- B. The Contract price may only be changed by a change order. Any request for an increase in the Contract price shall be based on written notice delivered by the Contractor to the Construction Manager promptly, but in no event later than 10 days after the date of the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the amount of the request with supporting data shall be delivered within 45 days after the date of the occurrence, unless the Construction Manager allows an additional period of time to ascertain more accurate data in support of the request, and shall be accompanied by the Contractor's written statement that the amount requested covers all amounts (direct, indirect, and consequential) to which the Contractor is entitled as a result of the occurrence of the event. No request for an adjustment in the Contract price will be valid if not submitted in accordance with this Article.
- C. The value of any work covered by a change order or of any request for an increase or decrease in the Contract price shall be determined in one of the following ways:
 1. Where the work involved is covered by unit prices contained in the Contract documents, by application of unit prices to the quantities of the items involved; or
 2. By mutual acceptance of a lump sum, which may include an allowance for overhead and profit not necessarily in accordance with Article 5.04.04; or
 3. On the basis of the cost of work (determined as provided in Articles 5.04.02. and 5.04.03.) plus a Contractor's fee for overhead and profit (determined as provided in Article 5.04.04.)

5.04.02 Cost of Work (Based on Time and Materials)

- A. General: The term “cost of work” means the sum of all costs necessarily incurred and paid by the Contractor for labor, materials, and equipment in the proper performance of work. Except as otherwise may be agreed to in writing by METRO, such costs shall be in amounts no higher than those prevailing in the locality of the project.
- B. Labor: The cost of labor used in performing work by the Contractor, a subcontractor, or other forces, will be the sum of the following:
1. The actual wages paid plus any employer payments to or on behalf of workers for fringe benefits, including health and welfare, pension, vacation, and similar purposes. The cost of labor may include the wages paid to foremen when it is determined by the Construction Manager that the services of foremen do not constitute a part of the overhead allowance.
 2. There will be added to the actual wages as defined above, a percentage set forth in the latest “Labor Surcharge and Equipment Rental Rates” in use by the California State Department of Transportation which is in effect on the date upon which the work is accomplished. This percentage shall constitute full compensation for all payments imposed by State and Federal laws including, but not limited to, workers’ compensation insurance and Social Security payments.
 3. The amount paid for subsistence and travel required by collective bargaining agreements.
 4. For equipment operators, payment for the actual cost of labor and subsistence or travel allowance will be made at the rates paid by the Contractor to other workers operating similar equipment already on the work, or in the absence of such labor, established by collective bargaining agreements for the type of workers and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of subsection 2 of Article 5.04.02.B herein, which surcharge shall constitute full compensation for payments imposed by State and Federal laws, and all other payments made to on behalf of workers other than actual wages.
- C. Materials: The cost of materials used in performing work will be the cost to the purchaser, whether Contractor or subcontractor, from the supplier thereof, except as the following are applicable:
1. Trade discounts available to the purchaser shall be credited to METRO notwithstanding the fact that such discounts may not have been taken by the Contractor.
 2. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the Construction Manager. Markup, except for actual costs incurred in the handling of such materials, will not be allowed.
 3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on extra work items or the current wholesale price for such materials delivered to the work site, whichever price is lower.
 4. If, in the opinion of the Construction Manager, the cost of material is excessive, or the Contractor does not furnish satisfactory evidence of the cost of such material, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned delivered to the work site, less trade discount. METRO reserves the right to furnish materials for the extra work and no claim shall be made by the Contractor for costs and profit on such materials.
- D. Equipment: The Contractor will be paid for the use of equipment at the rental rate listed for such equipment specified in the current edition of the Department of Transportation publication entitled, “Labor Surcharge and Equipment Rental Rates,” which is in effect on the date upon which the work is accomplished. Such rental rates will be used to compute

payments for equipment whether the equipment is under the Contractor's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate resulting in the least total cost to METRO for the total period of use. If it is deemed necessary by the Contractor to use equipment not listed in the foregoing publication, the Construction Manager will establish an equitable rental rate for the equipment. The Contractor may furnish cost data that might assist the Construction Manager in the establishment of the rental rate.

1. The rental rates paid, as above provided, shall include the cost of fuel, oil, lubrication supplies, small tools, necessary attachments, repairs and maintenance of all kinds, depreciation, storage, insurance, and all incidentals. Operators of equipment will be separately paid for as provided in subsection 4 of Article 5.04.02.B.
 2. All equipment shall be in good working condition and suitable for the purpose for which the equipment is to be used.
 3. Before construction equipment is used on the extra work, the Contractor shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the Construction Manager, in duplicate, a description of the equipment and its identifying number.
 4. Unless otherwise specified, manufacturer's ratings and manufacturer-approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment, which has no direct power unit, shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
 5. Individual pieces of equipment or tools having a replacement value of \$500 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.
- E. Owner-Operated Equipment: When owner-operated equipment is used to perform work and is to be paid for as extra work, the Contractor will be paid for the equipment and operator as follows:

Payment for the equipment will be made in accordance with the provisions in Article 5.04.02.D. "Equipment."

Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the Contractor to other workers operating similar equipment already on the project, or, in the absence of such other workers, at the rates for such labor established by collective bargaining agreement for type of worker and location of the work, whether or not the owner-operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein, in accordance with the provisions in subsection 2 of Article 5.04.02(B), "Labor."

To the direct cost of equipment rental and labor, computed as provided herein, will be added the markup for equipment rental and labor as provided in Article 5.04.04, "Contractor's Fee."

- F. Equipment Time: The rental time to be paid for equipment on the work shall be the time the equipment is in productive operation on the work being performed and shall include the time required to move the equipment to the new location and return it to the original location or to another location requiring no more time than that required to return it to its original location; except, that moving time will not be paid if the equipment is used on other than the extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power. No payment will be made for loading and transporting costs when the equipment is used at the site of the extra work on other than the extra work. The following shall be used in computing the rental time of equipment on the work:

1. When hourly rates are listed, any part of an hour less than 30 minutes of operation shall be considered to be ½-hour of operation, and any part of an hour in excess of 30 minutes will be considered 1-hour of operation.
2. When daily rates are listed, operation for any part of a day less than 4 hours shall be considered to be ½-day of operation.
3. Rental time will not be allowed while equipment is inoperative due to breakdowns or Contractor caused delays.
- G. Cost of Work Documentation: The Contractor shall furnish the Construction Manager Daily Extra Work Reports on a daily basis covering the direct costs of labor and materials and charges for equipment whether furnished by the Contractor, subcontractor, or other forces. METRO will provide the Extra Daily Work Report forms to the Contractor. The Contractor or an authorized agent shall sign each Daily Extra Work Report. The Daily Extra Work Report shall provide names and classifications of workers and hours worked; size, type, and identification number of equipment; and the hours operated. Copies of certified payrolls and statement of fringe benefit shall substantiate labor charges. Valid copies of vendor's invoices shall substantiate material charges.

The Construction Manager will make any necessary adjustments. When these reports are agreed upon and signed by both parties, they shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on a later audit.

The Contractor shall inform the Construction Manager when extra work will begin so that METRO inspector can confer with the Daily Extra Work Reports. Failure to conform to these requirements may impact the Contractor's ability to receive proper compensation.

5.04.03. Special Services

Special services are defined as that work characterized by extraordinary complexity, sophistication, or innovations, or a combination of the foregoing attributes that are unique to the construction industry. The following may be considered by the Construction Manager in making estimates for payment for special services:

- A. When the Construction Manager and the Contractor, by agreement, determine that a special service is required which cannot be performed by the forces of the Contractor or those of any of its subcontractors, the special service may be performed by an entity especially skilled in the work to be performed. After validation of invoices and determination of market values by the Construction Manager, invoices for special services based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental costs.
- B. When the Contractor is required to perform work necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the jobsite, the charges for that portion of the work performed at the offsite facility may, by agreement, be accepted as a special service and accordingly, the invoices for the work may be accepted without detailed itemization.
- C. All invoices for special services will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of the allowances for overhead and profit on labor, materials, and equipment specified in Article 5.04.04. herein, a single allowance of ten (10) percent will be added to invoices for special services.

5.04.04. Contractor's Fee

- A. Work ordered on the basis of time and materials will be paid for at the actual and necessary cost as determined by the Construction Manager, plus allowances for overhead and profit which allowances shall constitute the "Contractor's Fee," except as provided in subparagraph B of this Article. For extra work involving a combination of increases and decreases in the

work, the actual necessary cost will be the arithmetic sum of the additive and deductive costs. The allowance for overhead and profit shall include compensation for superintendence, bond and insurance premiums, taxes, all field and home office expenses, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Articles 5.04.02.B, C, D, and E, herein. The allowance for overhead and profit will be made in accordance with the following schedule:

Actual Necessary Cost	Overhead and Profit Allowance
Labor.....	33 percent
Materials	15 percent
Equipment.....	15 percent

- B. Labor, materials, and equipment may be furnished by the Contractor or by the subcontractor on behalf of the Contractor. When a subcontractor performs all or any part of the extra work, the allowance specified in subparagraph A of Article 5.04.04 shall only be applied to the labor, materials, and equipment costs of the subcontractors to which the Contractor may add 5 percent of the subcontractor's total cost for the extra work. Regardless of the number of hierarchical tiers of subcontractors, the 5 percent increase above the subcontractor's total cost, which includes the allowances for overhead and profit specified herein, may be applied one time only for each separate work transaction.

5.04.05. Compensation for Time Extensions

Adjustments in compensation for time extension will be allowed only for causes in Article 5.05.01.B.1 through Article 5.05.01.B.4 computed in accordance with Article 5.04 and the following. No adjustments in compensation will be allowed when District-caused delays to a controlling item of work and Contractor-caused delays to a controlling item of work occur concurrently or for causes in Article 5.05.01.B.5 through Article 5.05.01.B.6.

Compensation for idle time of equipment will be determined in accordance with the provisions in Article 5.04.02.E and Section 8-1.09 of the State Specifications.

5.05. Change of Contract Time

5.05.01. General

- A. The Contract time may only be changed by a change order. Any request for an extension of the Contract time shall be based on written notice delivered by the Contractor to the Construction Manager promptly, but in no event later than 10 days after the date of the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the extent of the request with supporting data shall be delivered within 45 days after the date of such occurrence, unless the Construction Manager allows an additional period of time to ascertain more accurate data in support of the request, and shall be accompanied by the Contractor's written statement that the adjustment requested is the entire adjustment to which the Contractor has reason to believe it is entitled as a result of the occurrence of said event. No request for an adjustment in the Contract time will be valid if not submitted in accordance with the requirements of this Article.

The Contract time will only be extended when a delay occurs which impacts a controlling item of work as shown on the work schedules required in the Special Provisions. Time extensions will be allowed only if the cause is beyond the control and without the fault or negligence of the Contractor. Time extensions will also be allowed when District-caused delays to a controlling item of work and Contractor-caused delays to a controlling item of work occur concurrently. The Contractor will be notified if the Construction Manager determines that a time extension is not justified.

- B. The Contract time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if a request is made therefore as provided in this Article. An extension of Contract time will only be granted for days on which the Contractor is prevented

from proceeding with at least 75 percent of the normal labor and equipment force actually engaged on the said work, by said occurrences or conditions resulting immediately therefrom which impact a controlling item of work as determined by the Construction Manager. Such delays shall include:

1. Changes.
2. Failure of METRO to furnish access, right of way, completed facilities of related projects, Drawings, materials, equipment, or services for which METRO is responsible.
3. Survey error by METRO.
4. Suspension of work pursuant to Articles 7.05(A) and 7.05(C).
5. Occurrences of a severe and unusual nature including, but not restricted to, acts of God, fires, and excusable inclement weather. An "act of God" means an earthquake, flood, cloudburst, cyclone or other cataclysmic phenomena of nature beyond the power of the Contractor to foresee or to make preparation in defense against, but does not include ordinary inclement weather. Excusable inclement weather is any weather condition, the duration of which varies in excess of the average conditions expected, which is unusual for the particular time and place where the work is to be performed, or which could not have been reasonably anticipated by the Contractor, as determined from U.S. Weather Bureau records for the proceeding 3-year period or as provided for in the Special Provisions.
6. Act of the public enemy, act of another governmental entity, public utility, epidemic, quarantine restriction, freight embargo, strike, or labor dispute. A delay to a subcontractor or supplier due to the above circumstances will be taken into consideration for extensions to the time of completion.

5.05.02. Extensions of Time for Delay Due to Excusable Inclement Weather

- A. The Contract time will be extended for as many days in excess of the average number of days of excusable inclement weather, as defined in Article 5.05.01.B.5., as the Contractor is specifically required under the Special Provisions to suspend construction operations, or as many days as the Contractor is prevented by excusable inclement weather, or conditions resulting immediately therefrom, from proceeding with at least 75 percent of the normal labor and equipment force engaged on critical items of work as shown on the schedule.
- B. Should the Contractor prepare to begin work at the regular starting time at the beginning of any regular work shift on any day on which excusable inclement weather, or the conditions resulting from the weather prevents work from beginning at the usual starting time and the crew is dismissed as a result thereof, the Contractor will be entitled to a 1-day extension whether or not conditions change thereafter during said day and the major portion of the day could be considered to be suitable for such construction operations.
- C. The Contractor shall base the construction schedule upon the inclusion of the number of days of excusable inclement weather specified in the Article titled "Excusable Inclement Weather Delays," of the Special Provisions. No extension of the Contract time due to excusable inclement weather will be considered until after the said aggregate total number of days of excusable inclement weather has been reached; however, no reduction in Contract time would be made if said number of days of excusable inclement weather is not reached.

5.06. Changed Site Conditions

If any work involves digging trenches or other excavations below the surface, the Contractor shall promptly and before the following conditions are disturbed, notify METRO in writing of any:

- A. Material that the Contractor believes may be a regulated material that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

- B. Subsurface or latent physical conditions at the site differing from those indicated in this Contract.
- C. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

METRO will promptly investigate the condition and if it finds that the conditions do materially so differ, or do involve regulated material, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, METRO will issue a change order under the procedures described in this Contract. For regulated materials, METRO reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing regulated material from such areas.

In the event that a dispute arises between METRO and the Contractor on whether the conditions materially differ or on the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by this Contract but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by this Contract or by law, which pertain to the resolution of disputes and protests between the contracting parties.

5.07 Waivers and Releases

Contractor is required to provide unconditional waivers and releases of stop notices in accordance with California Civil Code §3262(d)(2). METRO agrees to pay Contractor within 30 days after receipt of an undisputed and properly submitted payment request from the Contractor. If METRO fails to make such payments in a timely manner, METRO shall pay interest to the Contractor equivalent to the legal rate set forth in Subdivision (a) of Section 685.010 of the Code of Civil Procedure. For purposes of this section, "progress payment" includes all payments due contractor, except that portion of the final payment designated by the contract as retention earnings. Any payment request determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven days, after receipt. A request returned pursuant to this paragraph shall be accompanied by a written explanation of why the payment request is not proper. The number of days available to METRO to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which METRO exceeds the seven-day return requirement set forth above. A payment request shall be considered properly executed if funds are available for payment of the payment request and payment is not delayed due to an audit inquiry by METRO's financial officer.

6. NOTICES

All notices under this Contract shall be in writing and shall be effective when received, if delivered by hand; or three (3) days after posting, if sent by registered mail, return receipt requested; to a party hereto at the address hereinunder set forth or to such other address as a party may designate by notice pursuant hereto.

METRO

Santa Cruz Metropolitan Transit District
 370 Encinal Street
 Suite 100
 Santa Cruz, CA 95060

Attention: General Manager

CONTRACTOR

Attention: _____

7. ENTIRE AGREEMENT

7.01 This Contract represents the entire agreement of the parties with respect to the subject matter hereof, and all such agreements entered into prior hereto are revoked and superseded by this Contract, and no representations, warranties, inducements or oral agreements have been made by any of the parties except as expressly set forth herein, or in other contemporaneous written agreements.

7.02 This Contract may not be changed, modified or rescinded except in writing, signed by all parties hereto, and any attempt at oral modification of this Contract shall be void and of no effect.

8. AUTHORITY

Each party has full power and authority to enter into and perform this Contract and the person signing this Contract on behalf of each has been properly authorized and empowered to enter into it. Each party further acknowledges that it has read this Contract, understands it, and agrees to be bound by it.

Signed on _____

METRO--SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

Leslie R. White
General Manager

CONTRACTOR-- _____

By _____

Approved as to Form:

Margaret Rose Gallagher
District Counsel

SAMPLE
CONTRACT

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, that _____
Called the Principal, and _____, a corporation duly organized under the laws of
the State of _____
Having its principal place of business at _____
In the State of _____, and authorized to do business in the State of California, herein called Surety,
are held and firmly bound unto the Santa Cruz Metropolitan Transit District hereinafter called "METRO",
"DISTRICT", or "Obligee" in the sum of _____
_____ (\$ _____) being not less than ONE HUNDRED PERCENT (100%) of
the total amount of the Contract price, lawful money of the United States of America, well and truly to be made, we
bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS the Principal has entered into a Contract with the Obligee for the construction of the MetroBase Project
Phase 1 and said Principal is required under the terms of said Contract No. 2004-903 to furnish a bond securing
payment of claims to which reference is made in Section 3248 of the California Civil Code.

NOW, THEREFORE, if said Principal or any of its subcontractors fails to pay any of the persons named in Section
3181 of the California Civil Code, or the amounts due under the California Unemployment Insurance Code with
respect to work performed under the Contract, or any amounts required to be deducted, withheld and paid over to the
California Employment Development Department from the wages of the Contractor and subcontractors pursuant to
Section 13020 of the California Unemployment Insurance Code with respect to such work and labor, the Surety will
pay same, in the amount not exceeding the sum specified in this bond, and will also pay, in case suit is brought upon
this bond, a reasonable attorney's fee, to such claimant and to the Obligee to be fixed by the court.

This bond will inure to the benefit of any persons named in Section 3181 of the California Civil Code so as to give a
right of action to such persons or to their assigns in any suit brought upon this bond.

This bond is given to comply with Sections 3247 through 3252 inclusive of the California Civil Code and shall inure
to the benefit of any and all persons, companies and corporations named in Section 3181 of said _____ so as to
give a right of action to them or their assigns in any suit brought upon this bond.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or
addition to the terms of the Contract, or to the work to be performed thereunder, or the specifications accompanying
the same shall, in any way, affect its obligations on this bond, and it does hereby waive notice of any such change,
extension of time, alteration, or addition to the terms of the Contract, or to the work or to the special provisions.
Said Surety hereby waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

To be considered complete, both the Bidder and an admitted Surety insurer authorized by the California Insurance
Commissioner to transact surety business in the State of California, must sign this Payment bond. In addition, the
Surety's signature must be notarized and a copy of the Surety's power of attorney must be attached.

IN WITNESS WHEREOF, the above bonded parties have executed this instrument under their seals this _____
day of _____, _____, the name and corporate seal of each corporate party being hereto affixed and
these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Seal)

PRINCIPAL

BY

PRINCIPAL SEAL

(Seal)

SURETY

BY

SURETY SEAL

ADDRESS OF SURETY

(This bond must be submitted in sets of four, each bearing original signatures. The signature of the Attorney-In Fact for the Surety must be acknowledged by a Notary Public. These bonds must be accompanied by a current Power of Attorney appointing such Attorney-In-Fact.)

FAITHFUL PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that WHEREAS, the Santa Cruz Metropolitan Transit District, herein called the "DISTRICT" or "METRO" or "Obligee" has entered into Contract No.06-01 with _____ called Principal for the construction of the MetroBase Vehicle Maintenance Building and Related Site Work, and;

WHEREAS, said Principal is required under the terms of Contract No.06-01 to furnish a bond for the faithful performance of the Contract;

NOW, THEREFORE, we, the Principal, and _____ as Surety, are held and firmly bound to METRO, in the penal sum of _____ (\$ _____) lawful money of the United States of America, well and truly to be made being one hundred percent (100%) of the contract amount, for the payment of which sum will and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above-bonded Principal; its heirs, executors, administrators, successors, or assigns shall in all things stand to and abide by and well and truly keep and faithfully perform the covenants, conditions and agreements in the said Contract and any alteration thereof, made as provided in the Contract, on its part to be kept and performed at the time and in the manner specified and in all respects according to their true intent and meaning, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

And the said Surety, for the value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way effect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the specifications. And the said surety, for value received, hereby stipulates and agrees to waive the provisions of the **California Civil Code Sections 2819 and 2845.**

As a condition precedent to satisfy completion of the Contract, the above obligations to the amount of _____ (\$ _____) being not less than FIFTY PERCENT (50%) of the total amount payable to METRO, under this Contract, shall hold good for a period of three (3) years after the completion and acceptance of said work, during which time if the Principal, or its heirs, executors, administrators, successors, or assigns makes full and satisfactory repair and replacement of defective materials, faulty workmanship, and work not conforming to the requirements of the Contract, and protects METRO from cost and damage caused by same, then the obligation in the sum of _____ (\$ _____) shall become null and void, otherwise it shall remain in full force and virtue.

In the event that METRO, or its successors or assigns, shall be the prevailing party in an action brought upon this bond, then, in addition to the penal sum specified herein above, we agree to pay to METRO, or its successors or assigns, a reasonable sum on account of attorney's fees in such action, which sum shall be fixed by the court.

California law shall govern the interpretation of this bond.

To be considered complete, both the Contractor and an admitted Surety insurer authorized by the California Insurance Commissioner to transact surety business in the State of California, must sign this Performance bond. In addition, the Surety's signature must be notarized and a copy of the Surety's power of attorney must be attached.

FAITHFUL PERFORMANCE BOND

IN WITNESS WHEREOF, the above bonded parties have executed this instrument under their seals this _____ day of _____, _____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

DATE

PRINCIPAL

BY

PRINCIPAL SEAL

SURETY

BY

SURETY SEAL

ADDRESS OF SURETY

[End of performance Bond.]

PART VI

FEDERAL TRANSIT ADMINISTRATION (FTA) REQUIREMENTS FOR CONSTRUCTION CONTRACTS

1.01 NO GOVERNMENT OBLIGATION TO THIRD PARTIES

- A METRO and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to METRO, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.
- B The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

1.02 PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

- A The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq and U.S DOT. Regulations “Program Fraud Civil Remedies”, 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes or it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.
- B The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by the FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 5307(n)(1) on the Contractor, the extent the Federal Government deems appropriate.
- C The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by the FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

1.03 ACCESS TO RECORDS AND REPORTS

- A. In accordance with 49 C.F.R. 18.36(i), Contractor agrees to provide METRO, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or authorized representative including any PMO Contractor access to Contractor’s records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through programs described at 49 U.S.C. 5307, 5309 or 531.
- B. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

- C. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until METRO, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

1.04 FEDERAL CHANGES

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference in the Master Agreement between METRO and the FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

1.05 CIVIL RIGHTS REQUIREMENTS

- A. Nondiscrimination-In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor and Subcontractor agree that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.
- B. Equal Employment Opportunity The following equal employment opportunity requirements apply to this contract:
1. Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor and Subcontractor agree to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
 2. Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

3. Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.
 4. In the event of the contractor's noncompliance with the nondiscrimination clauses of this agreement or with any of the said rules, regulations or orders, this agreement may be canceled, terminated or suspended in whole or in part. The contractor may be declared ineligible for further Government contracts or Federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor or as otherwise provided by law.
- C. The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

1.06 DISADVANTAGED BUSINESS ENTERPRISE (DBE)

- A. METRO, having received federal financial assistance from the FTA is committed to and has adopted a DBE Program in accordance with 49 C.F.R. part 26, issued by U.S.DOT.

It is the policy of METRO to insure nondiscrimination in the award and administration of U.S DOT assisted contracts and to create a level playing field on which the Disadvantaged Business Enterprises (DBE) can compete fairly for the contracts and Subcontracts relating to METRO's construction, procurement, and professional services activities. To this end, METRO has developed procedures to remove barriers to DBE participation in the bidding and award process and to assist DBEs to develop and compete successfully outside of the DBE program. In connection with the performance of this Contract, the Contractor will cooperate with METRO in meeting these commitments and objectives.

- B. Pursuant to 49 C.F.R. § 26.13, the Contractor is required to make the following assurance in this Contract with METRO and to include this assurance in any Contracts it makes with Subcontractors in the performance of this Contract:
1. The Contractor and each of its Subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 C.F.R. Part 26 in the award and administration of U.S. DOT. -assisted Contracts. Failure by the Contractor or Subcontractor to carry out these Requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy, as METRO deems appropriate.
 2. Additionally, all of the requirements described in the DBE Program shall be met. A Contract that has a specific DBE participation goal will be described in the Special Conditions.
 3. Any Contractor who would like to request additional information or ask questions regarding METRO's DBE program may contact METRO's DBE Representative through the Contract Specialist.
- C. DBE Program Definitions, as used in the contract:

Any terms used in this Program that are defined in 49 C.F.R. § 26.5 or elsewhere in the Regulations shall have the meaning set forth in the Regulations. Some of the most common terms are defined below:

1. Disadvantaged Business Enterprise DBE

A DBE is a for profit, small business concern; 1) that is at least fifty one percent (51%) owned by one or more individuals who are both socially and economically disadvantaged, or, in the case of a corporation, in which fifty one percent (51%) of the stock is owned by one or more socially or economically disadvantaged individuals; and 2) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

2. Small Business Concern

A small business concern is an existing small business, as defined by Section 3 of the Small Business Act and the Small Business Administration regulations implementing it (13 C.F.R. Part 121), whose average annual gross receipts for the previous three (3) years does not exceed \$16.6 million (or as adjusted for inflation by the Secretary of U.S. DOT) pursuant to 49 C.F.R. § 26.65(b).

3. Socially and Economically Disadvantaged Individuals

a. There is a rebuttable presumption that an individual is both socially and economically disadvantaged if s/he is a citizen or lawfully admitted permanent resident of the United States and is:

Black American (including persons having origins in any of the Black racial groups of Africa);

Hispanic American (including persons of Central or South American, Cuban, Dominican, Mexican, Puerto Rican, or other Spanish or Portuguese culture or origin, regardless of race);

Native American (including persons who are Aleuts, American Indians, Eskimos, or Native Hawaiians); Asian-Pacific American (including persons whose origins are from Brunei, Burma (Myanmar), Cambodia (Kampuchea), China, the Commonwealth of the Northern Marianas Islands, the Federated States of Micronesia, Fiji, Guam, Hong Kong, Indonesia, Japan, Juvalu, Kirbati, Korea, Laos, Macao, Malaysia, Nauru, the Philippines, Samoa, Taiwan, Thailand, Tonga, the U.S. Trust Territories of the Pacific Islands (Republic of Pilau), or Vietnam; Subcontinent Asian American (including persons whose origins are from Bangladesh, Bhutan, India, the Maldives Islands, Nepal, Pakistan, or Sri Lanka);

A Woman; or

A member of any additional group that is designated as socially and economically disadvantaged by the Small Business Administration.

b. Additionally, any individual can demonstrate, by a preponderance of evidence, that s/he is socially and economically disadvantaged on a case-by-case basis. METRO will follow the guidelines in 49 C.F.R. Part 26, Appendix E.

- c. An individual cannot be presumed or determined on a case-by-case basis to be economically disadvantaged if s/he has a personal net worth exceeding \$750,000 (excluding the individual's ownership interests in the small business concern and his or her primary residence).
 - i. Race-Neutral
A procedure or program that is used to assist all small businesses. For the purposes of this Program, race-neutral includes ethnic and gender neutrality.
 - ii. Race-Conscious
A measure or program that is specifically focused on assisting only DBEs, including women-owned DBEs.
 - iii. Personal Net Worth
The net value of the assets of an individual remaining after total liabilities is deducted. An individual's personal net worth does not include the individual's ownership interest in an applicant or participating DBE firm, or the individual's equity in his or her primary place of residence. An individual's personal net worth includes only his or her share of community property.

1.07 GOVERNMENT-WIDE DEBARMENT AND SUSPENSION

Instructions for Certification

- A. The certification in this clause is a material representation of fact upon which reliance was placed when this Contract was entered into. If it is later determined that the Contractor knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, METRO may pursue available remedies, including suspension and/or debarment, and/or contract termination.
- B. The Contractor shall provide immediate written notice to METRO if at any time the Contractor learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- C. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "persons," "principal," "bid," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549 [49 CFR Part 29]. You may contact METRO for assistance in obtaining a copy of those regulations.
- D. The Contractor agrees that by executing this Contract that, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized in writing by METRO.
- E. The Contractor further agrees by executing this Contract that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction", without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- F. A Contractor may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A Contractor may decide the method and frequency by which it determines the eligibility of its principals. Each participant

may, but is not required to, check the Non- procurement List issued by U.S. General Service Administration.

- G. Nothing contained in the foregoing shall be construed to require establishment of system of records in order to render in good faith the certification required by this clause. The knowledge and information of a Contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- H. If a Contractor in a covered by this Contract knowingly enters into a lower tier covered Contract with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this Contract , in addition to all remedies available to the Federal Government, METRO may pursue available remedies including suspension and/or debarment.

"Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction."

- (1) The Contractor certifies, by execution of this Contract, that neither it nor its "principals" [as defined at 49 C.F.R. § 29.105(p)] is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) When the Contractor is unable to certify to the statements in this certification, such prospective participant shall attach an explanation to this bid.

1.08 BUY AMERICA

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 CFR Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 CFR 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, microcomputer equipment, software, and small purchases (currently less than \$100,000) made with capital, operating, or planning funds. Separate requirements for rolling stock are set out at 5323(j)(2)(C) and 49 CFR 661.11. Rolling stock not subject to a general waiver must be manufactured in the United States and have a 60 percent domestic content.

A bidder must submit to METRO the appropriate Buy America Certification, Bid Form – Document 10, with all bids on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as non-responsive. This requirement does not apply to lower tier subcontractors.

1.09 LOBBYING

Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of \$100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to METRO.

1.10 CLEAN AIR

The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air, as amended 42 U.S.C. § 7401 et seq. The Contractor agrees to report each violation to METRO and understands and agrees that METRO will in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office. The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

1.11 CLEAN WATER REQUIREMENTS

- A. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to METRO and understands and agrees that METRO will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA regional office.
- B. The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

1.12 DAVIS-BACON ACT AND COPELAND ANTI-KICKBACK ACT

- A. Minimum wages - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.
- B. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.
 - 1. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - 2. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably

anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

3. The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:
 - (a) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (b) The classification is utilized in the area by the construction industry; and
 - (c) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
4. If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
5. In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
6. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (1)(iv) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
 - (a) Withholding –METRO shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, METRO may, after written notice to the contractor,

sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

- (b) Payrolls and basic records - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
7. The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to METRO for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.
- (a) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (i) That the payroll for the payroll period contains the information required to be maintained under 29 CFR part 5 and that such information is correct and complete;
 - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - (iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
8. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

9. The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
 - (a) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
 - (b) Apprentices and trainees - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
10. Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the

trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (a) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- B. Compliance with Copeland Act requirements - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- C. Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- D. Contract termination: debarment - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- E. Compliance with Davis-Bacon and Related Act requirements - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- F. Disputes concerning labor standards - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- G. Certification of eligibility –
 - 1. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - 2. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - 3. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

1.13 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

- A. Overtime requirements - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- B. Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$ 10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.
- C. Withholding for unpaid wages and liquidated damages - METRO shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.
- D. Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in this section.
- E. Payrolls and basic records - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- F. Section 107 (OSHA):- Contract Work Hours and Safety Standards Act –
 - 1. The Contractor agrees to comply with section 107 of the Contract Work Hours and Safety Standards Act, 40 U.S.C. section 333, and applicable DOL regulations, " Safety and Health Regulations for Construction " 29 C.F.R. Part 1926. Among other things, the Contractor agrees

that it will not require any laborer or mechanic to work in unsanitary, hazardous, or dangerous surroundings or working conditions.

2. Subcontracts - The Contractor also agrees to include the requirements of this section in each subcontract. The term "subcontract" under this section is considered to refer to a person who agrees to perform any part of the labor or material requirements of a contract for construction, alteration or repair. A person who undertakes to perform a portion of a contract involving the furnishing of supplies or materials will be considered a "subcontractor" under this section if the work in question involves the performance of construction work and is to be performed: (1) directly on or near the construction site, or (2) by the employer for the specific project on a customized basis. Thus, a supplier of materials which will become an integral part of the construction is a "subcontractor" if the supplier fabricates or assembles the goods or materials in question specifically for the construction project and the work involved may be said to be construction activity. If the goods or materials in question are ordinarily sold to other customers from regular inventory, the supplier is not a "subcontractor." The requirements of this section do not apply to contracts or subcontracts for the purchase of supplies or materials or articles normally available on the open market.

1.14 SEISMIC SAFETY REQUIREMENTS

The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

1.15 ENVIRONMENTAL PROTECTION

A. Contractor shall comply with all applicable requirements of the National Environmental Policy Act of 1969 as amended, 42 U.S.C. §§ 4321 et seq. consistent with Executive Order No. 11514 as amended, Protection and Enhancement of Environmental Quality, 42 U.S.C. §§ 4321 note; FTA statutory requirements on environmental matters at 49 U.S.C. § 5324(b); Council on Environmental Quality regulations on compliance with the National Environmental Policy Act of 1969 as amended, 40 C.F.R. part 1500 et seq.; and joint FHWA/FTA regulations "Environmental and Related Procedures," 23 C.F.R. Part 771 and 49 C.F.R. Part 622.

B. Contractor shall report and require each subcontractor at any tier to report any violation of these requirements resulting from any Contract activity of Contractor or subcontractor to FTA and the appropriate U.S. EPA Regional Office.

1.16 ENERGY CONSERVATION REQUIREMENTS

The Contractor agrees to comply with mandatory standard and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

1.17 PRIVACY ACT

The following requirements apply to the Contractor and its employees that administer any system of records on behalf of the Federal Government under any contract:

D. The Contractor agrees to comply with, and assures the compliance of its employees with, the information restrictions and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal

Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the underlying contract.

- B. The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

1.18 INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS

The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1E, dated June 19, 2003, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests, which would cause (name of grantee) to be in violation of the FTA terms and conditions.

1.19 WARRANTY FOR THE WORK AND MAINTENANCE BOND

- A. Contractor warrants to METRO that all materials and equipment furnished under this Contract will be of the highest quality and new unless otherwise specified by METRO, free from faults and defects and in conformance with the contract. All work not so conforming to these standards shall be considered defective. If required by METRO's Construction Manager, the contractor shall furnish satisfactorily evidence as to the kind and quality of material and equipment.
- B. The Work furnished must be of first quality and the workmanship must be the best obtainable in the various trades. The Work must be of safe, substantial and durable construction in all respects. The Contractor hereby guarantees the Work against defective materials or faulty workmanship for a minimum period of one (1) year after Final payment by (Recipient) and shall replace or repair any defective materials or equipment or faulty workmanship during the period of the guarantee at no cost to (METRO). As additional security for these guarantees, the Contractor shall, prior to the release of Final Payment, furnish separate Maintenance (or Guarantee) Bonds in form acceptable to METRO written by the same-corporate surety that provides the Performance Bond and Payment Bond for this Contract. These bonds shall secure the Contractor's obligation to replace or repair defective materials and faulty workmanship for a minimum period of one (1) year after Final Payment and shall be written in an amount equal to ONE HUNDRED PERCENT (100%) of the CONTRACT SUM, as adjusted (if at all).

1.20 RECYCLED MATERIALS

The Contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

1.21 FLY AMERICA REQUIREMENTS

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with

the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

1.22 CARGO PREFERENCE – USE OF UNITED STATES FLAG - VESSELS

The contractor agrees:

- A. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels;
- B. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United State, a legible copy of a rated, “on-board” commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Seventh Street, S.W., Washington D.C. 20590 and to the FTA recipient (through the contractor in the case of a subcontractor’s bill-of-lading.)
- C. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

PART VII
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
PROTEST PROCEDURE

PROCUREMENT PROTESTS

All protests shall be filed, handled and resolved in a manner consistent with the requirements of Federal Transit Administration (FTA) Circular 4220.1E Third Party Contracting Guidelines dated June 19, 2003 and the Santa Cruz Metropolitan Transit District's (METRO) Protest Procedures which are on file and available upon request.

Current FTA Policy states that: "Reviews of protests by FTA will be limited to:

- (1) a grantee's failure to have or follow its protest procedures, or its failure to review a complaint or protest; or
- (2) violation of Federal law or regulation.

An appeal to FTA must be received by the cognizant FTA regional or Headquarters Office within five (5) working days of the date the protester learned or should have learned of an adverse decision by the grantee or other basis of appeal to FTA" (FTA Circular 4220.1E, Section 7, paragraph 1., Written Protest Procedures)

Protests relating to the content of this Invitation for Bid (IFB) package must be filed within ten (10) calendar days prior to the bid opening date. Protests relating to a recommendation for award solicited by this IFB must be filed by an interested party within five (5) calendar days after the staff's written recommendation and notice of intent to award is issued to the bidders. The date of filing shall be the date of receipt of protests or appeals by the METRO.

All Protests shall be filed in writing with the Assistant General Manager, Santa Cruz Metropolitan Transit District, 370 Encinal Street, Suite 100, Santa Cruz, CA 95060. **No other location shall be acceptable.** The METRO will respond in detail to each substantive issue raised in the protest. The Assistant General Manager shall make a determination on the protest normally within ten (10) working days from receipt of protest. Any decision rendered by the Assistant General Manager may be appealed to the Board of Directors. The Protester has the right within five (5) working days of receipt of determination to file an appeal restating the basis of the protest and the grounds of the appeal. In the appeal, the Protester shall only be permitted to raise factual information previously provided in the protest or discovered subsequent to the Assistant General Manager's decision and directly related to the grounds of the protest. The Board of Directors has the authority to make a final determination and the Board of Director's decision shall constitute the METRO's final administrative remedy.

In the event the protestor is not satisfied with the METRO's final administrative determination, they may proceed within 90 days of the final decision to State Court for judicial relief. The Superior Court of the State of California for the County of Santa Cruz is the appropriate judicial authority having jurisdiction over Bid Protest(s) and Appeal(s). Bid includes the term "offer" or "proposal" as used in the context of negotiated procurements.

The Bidder may withdraw its protest or appeal at any time before the METRO issues a final decision.

Should the METRO postpone the date of bid submission owing to a protest or appeal of the solicitation specifications, addenda, dates or any other issue relating to this procurement, the METRO shall notify, via addendum, all parties who are on record as having obtained a copy of the solicitation documents that an appeal/protest had been filed, and the due date for bid submission shall be postponed until the METRO has issued its final decision.

A letter of protest must set forth the grounds for protest and shall be fully supported with technical data, test results, or other pertinent information related to the subject being protested. The Protestor is responsible for adhering to the METRO's protest procedures.

A Bidder may seek FTA review of the METRO's decision. A protest appeal to the FTA must be filed in accordance with the provisions of FTA circular 4220.1E. Any appeal to the FTA shall be made not later than five (5) working days after a final decision is rendered under the METRO's protest procedure. Protest appeals should be filed with:

Federal Transit Administration
Regional Administrator Region IX
201 Mission Street, Suite 2210
San Francisco, CA 94105-1839

ATTACHMENT A

NOTICE TO BIDDERS/PROPOSERS DISADVANTAGED BUSINESS ENTERPRISE INFORMATION

The Santa Cruz Metropolitan Transit District (District) has determined that Disadvantaged Business Enterprises (DBE) can reasonable be expected to compete for the opportunities in this Agreement and has established a DBE Availability Advisory 1.57 percentage. It is therefore the District's expectation that available DBE firms have an opportunity to participate in this Agreement.

1. TERMS AS USED IN THIS DOCUMENT

- The term "Disadvantaged Business Enterprise" or "DBE" means a for-profit small business concern as defined in Title 49, Part 26.5, Code of Federal Regulations (CFR).
- The term "bidder" also means "proposer" or "offerer".
- The term "Agreement" also means "Contract".
- Agency also means the local entity entering into this contract with the Contractor or Consultant.
- The term "Small Business" or "SB" is as defined in 49 CFR 26.65.

2. AUTHORITY AND RESPONSIBILITY

- A. DBEs and other small businesses are strongly encouraged to participate in the performance of Agreements financed in whole or in part with federal funds (See 49CFR26, "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs"). The Contractor should ensure that DBEs and other SBs have the opportunity to participate in the performance of the work that is the subject of this solicitation and should take all necessary and reasonable steps for this assurance. The bidder/proposer shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts.
- B. Bidders/Proposers are encourage to use services offered by financial institutions owned and controlled by DBEs.
- C. Meeting the DBE Availability Advisory Percentage is not a condition for being eligible for award of the Agreement.

3. SUBMISSION OF DBE INFORMATION

A "Local Agency Proposer/Bidder-DBE (Consultant Contracts)-Information" form will be included in the Agreement documents to be executed by the successful bidder. The purpose of the form is to collect data required under 49 CFR 26. Even if no DBE participation will be reported, the successful bidder must execute and return the form.

4. DBE PARTICIPATION GENERAL INFORMATION

It is the bidder's responsibility to be fully informed regarding the requirements of 49 CFR, Part 26, and the Department's DBE program developed, pursuant to the regulations. Particular attention is directed to the following:

- A. A DBE must be a small business firm defined pursuant to 13 CFR 121 and be certified through the California Unified Certification Program (CUCP).
- B. A certified DBE may participate as a prime contractor, subcontractor, joint venture partner, as a vendor of material or supplies, or as a trucking company.
- C. A DBE joint-venture partner must be responsible for specific contract items of work or clearly defined portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint-venture partner must share in the capital contribution, control, management, risks and profits of the joint-venture commensurate with its ownership interest.
- D. A DBE must perform a commercially useful function, pursuant to 49 CFR 26.55 that is, must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work./
- E. The bidder (prime contractor) shall list only one subcontractor for each portion of work as defined in their bid/proposal and all DBE subcontractors should be listed in the bid/cost proposal list of subcontractors.
- F. A prime contractor who is a certified DBE is eligible to claim all of the work in the Agreement toward the DBE participation except that portion of the work to be performed by non-DBE subcontractors.

5. RESOURCES

- A. The CUCP database includes the certified DBEs from all certifying agencies participating in the CUCP. If you believe a firm is certified that cannot be located on the database, please contact the Caltrans Office of Certification toll free number (866) 810-6346 for assistance. Bidder/Proposer may call (916) 440-0539 for web or download assistance.
- B. Access the CUCP database from the Department of Transportation, Civil Rights, Business Enterprise Program website at: <http://www.dot.ca.gov/hq/bep/>.
 - Click on the link in the left menu titled Find a Certified Firm
 - Click on Query Form link, located in the first sentence
 - Click on CUCP Database Certified DBEs located on the first line in the center of the page
 - Click on Click To Access DBE Query Form
 - Searches can be performed by one or more criteria
 - Follow instructions on the screen

- “Start Search”, “Clear Form”, “Civil Rights Home”, and “Caltrans Home” links are located at the bottom of the query form

C. How to Obtain a List of Certified DBEs without internet Access

DBE Directory: If you do not have Internet access, Caltrans also publishes a directory of certified DBE firms extracted from the on-line database. A copy of the directory of certified DBEs may be ordered from the Caltrans Division of Procurement and Contracts/Material and Distribution Branch/Publication Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone (916) 445-3520.

6. WHEN REPORTING DBE PARTICIPATION, MATERIAL OR SUPPLIES PURCHASED FROM DBES MAY COUNT AS FOLLOWS:

- A. If the materials or supplies are obtained from a DBE manufacturer, one hundred percent of the cost of the materials or supplies will count toward the DBE participation. A DBE Manufacturer is a firm that operates or maintains a factory, or establishment that produces on the premises, the materials, supplies, articles, or equipment required under the Agreement and of the general character described by the specifications.
- B. If the materials or supplies purchased from a DBE regular dealer, count sixty percent of the cost of the materials or supplies toward DBE participation. A DBE regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the Agreement are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating or maintaining a place of business provided in this section.
- C. If the person both owns and operates distribution equipment for the products, any supplementing of regular dealers’ own distribution shall be by a long-term lease agreement and not an ad hoc or Agreement-by-Agreement basis. Packagers, brokers, manufacturers’ representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this section.
- D. Materials or supplies purchased from a DBE, which is neither a manufacturer nor a regular dealer, will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on the job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

7. WHEN REPORTING DBE PARTICIPATION, PARTICIPATION OF DBE TRUCKING COMPANIES MAY COUNT AS FOLLOWS:

- A. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible.
- B. The DBE must itself own and operate at least one fully licensed, insured and operational truck used on the Agreement.
- C. The DBE receives credit for the total value of the transportation services it provides on the Agreement using trucks it owns, insures, and operates using drivers it employs.
- D. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Agreement.
- E. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by the DBE.
- F. For the purposes of this Section item D, a lease must indicate that the DBE has exclusive use and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, as long as the lease gives the DBE absolute priority for use of the leased truck. Leased truck must display the name and identification number of the DBE.

ATTACHMENT B

STANDARD AGREEMENT FOR SUBCONTRACTOR/DBE PARTICIPATION

1. Subcontractors

- A. Nothing in this Agreement or otherwise, shall create any contractual relation between the District and any subcontractors, and no subcontract shall relieve the Contractor of his/her responsibilities and obligations hereunder. The Contractor agree to be as fully responsible to the District for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by any of them as it is for the acts and omissions of persons directly employed by the Contractor. The Contractor's obligation to pay its subcontractors is an independent obligation of the District's obligation to make payments to the Contractor.
- B. Any subcontract in excess of \$25,000, entered into as a result of this Agreement, shall contain all the provisions stipulated in this Agreement to be applicable to subcontractors.
- C. Contractor shall pay its subcontractors within ten (10) calendar days from receipt of each payment made to the Contractor by the District.
- D. Any substitution of subcontractors must be approved in writing by the District's Contract Manager in advance of assigning work to a substitute subcontractor.

2. Disadvantaged Business Enterprise Program Availability Advisory

- A. This Agreement is subject to Title 49, Part 26, Code of Federal Regulations (49 CFR 26) entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." In order to ensure District achieves its federally mandated statewide overall DBE goal, the District encourages the participation of Disadvantaged Business Enterprises (DBEs), as defined in 49 CFR 26 in the performance of Agreements financed in whole or in part with federal funds. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts.
- B. As required by federal law, District has established a DBE goal. In order to ascertain whether the overall DBE goal is being achieved, the District is tracking DBE participation on all federal-aid contracts.
- C. To assist contractors in ascertaining DBE availability for specific items of work, the District advises that it has determined that DBEs could reasonably be expected to compete for subcontracting opportunities on this project and the likely DBE Availability Advisory Percentage is 1.57 percent. The District also advises that participation of DBEs in the specified percentage is not a condition of award.
- D. Contractor has agreed to carry out applicable requirements to Title 49 CFR 26, in the award and administration of federally assisted Agreements. The regulations in their entirety are incorporated herein and by reference.

- E. The contractor should notify the Contract Manager in writing of any changes to its anticipated DBE participation. This notice should be provided prior to the commencement of that portion of the work.
 - F. DBE and other small Businesses (SB), as identified in Title 49 CFR 26 are encouraged to participate in the performance of agreements financed in whole or in part with federal funds. The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Agreement. The contractor shall carry out applicable requirements of Title 49 CFR 26 in the award and administration of US DOT-assisted agreements. Failure by the contractor to carry out these requirements is a material breach of this agreement, which may result in the termination of this Agreement or such other remedy as the recipient deems appropriate.
 - G. Any subcontract entered into as a result of this Agreement shall contain all of the provisions of this section.
4. Performance of DBE Contractors, and other DBE Subcontractors/Suppliers
- A. A DBE performs a commercially useful function when it is responsible for execution of the work of the Agreement and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible with respect to materials and supplies used on the Agreement, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, evaluate the amount of work subcontracted, industry practices; whether the amount the firm is to be paid under the Agreement is commensurate with the work it is actually performing, and other relevant factors.
 - B. A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, Agreement, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, examine similar transactions, particularly those in which DBEs do not participate.
 - C. If a DBE does not perform or exercise responsibility for at least thirty percent of the total cost of its Agreement with its own work force, or the DBE subcontracts a greater portion of the work of the Agreement than would be expected on the basis of normal industry practice for the type of work involved, it will be presumed that it is not performing a commercially useful function.
5. Prompt Payment of Funds Withheld to Subcontractors
- A. The District shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the District, of the contract work, and pay retainage to the prime contractor based on these acceptances. The prime contractor, or subcontractor, shall return all monies withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the District. Federal law (49 CFR 26.29) requires that any delay or postponement of payment over 30-days may take place only for good cause and with the District's prior written approval. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the prime contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or

noncompliance by a subcontractor. This provision applies to both DBE and non-DBE prime contractors and subcontractors.

B. Any subcontract entered into as a result of this Agreement shall contain all of the provisions of this section.

6. DBE Records

A. The Contractor shall maintain records of materials purchased and/or supplied from all subcontracts entered into with certified DBEs. The records shall show the name and business address of each DBE or vendor and the total dollar amount actually paid each DBE or vendor, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all firms. DBE prime contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

B. Upon completion of the Agreement, a summary of these records shall be prepared and submitted on the form entitled, "Final Report-Utilization of Disadvantaged Business Enterprises (DBE)", CEM-2402F (Exhibit 17-F in Chapter 17 of the LAP), certified correct by the contractor or the contractor's authorized representative and shall be furnished to the Contract Manager with the final invoice. Failure to provide the summary of DBE payments with the final invoice will result in twenty-five percent (25%) of the dollar value of the invoice being withheld from payment until the form is submitted. The amount will be returned to the contractor when a satisfactory "Final Report Utilization of Disadvantaged Business Enterprises (DBE)" is submitted to the Contract Manager.

a. Prior to the fifteenth of each month, the contractor shall submit documentation to the District's Contract Manager showing the amount paid to DBE trucking companies. The contractor shall also obtain and submit documentation to the District's Contract Manager showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. If the DBE leases trucks from a non-DBE, the contractor may count only the fee or commission the DBE receives as a result of the lease arrangement.

b. The contractor shall also submit to the District's Contract Manager documentation showing the truck number, name of owner, California Highway Patrol CA number, and if applicable, the DBE certification number of the truck owner for all trucks used during that month. This documentation shall be submitted on the Caltrans Monthly DBE Trucking Verification, CEM-2404(F) form provided to the contractor by the District's Contract Manager.

7. DBE Certification and De-certification Status

A. If a DBE subcontractor is decertified during the life of the Agreement, the decertified subcontractor shall notify the contractor in writing with the date of de-certification. If a subcontractor becomes a certified DBE during the life of the Agreement, the subcontractor shall notify the contractor in writing with the date of certification. Any changes should be reported to the District's Contract Manager within 30 days.

When reporting DBE participation, material or supplies purchased from DBEs may count as follows:

B. If the materials or supplies are obtained from a DBE manufacturer, 100% of the cost of the materials or supplies will count toward DBE participation. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces on the premises, the materials, supplies,

articles, or equipment required under the Agreement and of the general character described by the specifications.

- C. If the materials or supplies purchased from a DBE regular dealer, count 60% of the cost of the materials or supplies toward DBE goals. A DBE regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the Agreement, are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating or maintaining a place of business provided in this section.
- D. If the person both owns and operates distribution equipment for the products, any supplementing of regular dealers' own distribution equipment, shall be by a long-term lease agreement and not an ad hoc agreement-by-agreement basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this section.
- E. Materials or supplies purchased from a DBE, which is neither a manufacturer nor a regular dealer, will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on the job site, provided the fees are reasonable and excessive as compared with fees charged for similar services.

When reporting DBE participation, participation of DBE trucking companies may count as follows:

- F. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible.
- G. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the Agreement.
- H. The DBE receives credit for the total value of the transportation services it provides on the Agreement using trucks it owns, insures, and operates using drivers it employs.
- I. The DBE may lease trucks from another DBE firm including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Agreement.
- J. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease agreement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by the DBE.
- K. For the purposes of this section, a lease must indicate that the DBE has exclusive use and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, as long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

DOCUMENT 00320

GEOTECHNICAL INVESTIGATION INFORMATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Geotechnical investigation reports have been prepared for this Project.

1.02 REFERENCES

- A. Copies of the following geotechnical reports are available from the Owner upon request.

1. Geotechnical Investigation
Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance
Facilities
Santa Cruz, California

By: Cotton, Shires & Associates, Inc.
5245 Avenida Encina; Ste. A
Carlsbad, CA 92008-4374
Dated: April 2004
Project No.:

2. Wave Equation Analysis results (WEAP)
Santa Cruz Metro
Santa Cruz, California

By: GRL Engineers, Inc.
4535 renaissance Parkway
Cleveland, OH 44128
Dated: September 8, 2004
GLR Job No.: 048031

3. Additional Geotechnical Engineering Analysis, 16-inch Square Piles
Santa Cruz Metropolitan Transit District (SCMTD)
Santa Cruz, California

By: Cotton, Shires & Associates, Inc.
5245 Avenida Encina; Ste. A
Carlsbad, CA 92008-4374
Dated: September 29, 2004
Project No.: E0024

1.03 PROJECT CONDITIONS

- A. Existing Site Conditions:

1. The reports referenced above are for Contractor's use for information only.
2. Data in the geotechnical investigation reports was used as a basis for design of certain building, structure, site and other elements of the Project.

3. The opinions expressed in these reports are those of the Owner's geotechnical engineers and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer.
4. Conditions are not intended as representations or warranties of the accuracy or continuity between soil borings and other samples taken from the site.
5. The Owner shall not be held responsible for interpretations or conclusions drawn by the Contractor from the data presented in the geotechnical investigation report.

1.04 OWNER'S INSTRUCTIONS

- A. Additional geotechnical investigations, including but not limited to test borings and site samples, made by Contractor for the performance of the Work, including but not limited to excavation support and protection, shall be made at no change in Contract Sum to the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF DOCUMENT 00320

**SANTA CRUZ METROPOLITAN
TRANSIT DISTRICT
METROBASE PROJECT
MAINTENANCE BUILDING**

***Golf Club Drive
Santa Cruz, California***



METRO IFB No. 06-01

VOLUME 2 of 3
Divisions 01 through 09

Construction Documents Project Manual

Construction Documents dated June 29, 2006
(IFB dated August 22, 2006)

Architect's Project No.: 6040-1569-01



800 Wilshire Boulevard; Suite 400
Los Angeles, California 90017

DOCUMENT 00005

CERTIFICATIONS PAGE

Santa Cruz Metropolitan Transit District
Metrobase Project, Maintenance Building

Volume 2 of 3: Introductory Information, Divisions 1 through 9

We hereby certify that these Contract Documents have been prepared by us or under our direct supervision in accordance with the rules and regulations governing the Architects and Engineers practicing in the State of California.

Architect

RNL Design
800 Wilshire Boulevard; Suite 400
Los Angeles, Ca 90017

Civil Engineer

Mesiti-Miller Engineering
224 Walnut Avenue; Ste.B
Santa Cruz, CA 95060

Structural Engineer

Mesiti-Miller Engineering
224 Walnut Avenue; Ste.B
Santa Cruz, CA 95060

DOCUMENT 00006

PROJECT DIRECTORY

Santa Cruz Metropolitan Transit District
Metrobase Project, Maintenance Building

Owner		
Santa Cruz MTD 370 Encinal Street; Ste. 100 Santa Cruz, CA 95060	Les White lwhite@scmttd.com Frank Cheng fcheng@scmttd.com	831-426-6080 Fax 831-426-6117
Architect		
RNL Design 800 Wilshire Boulevard; Suite 400 Los Angeles, Ca 90017	Chuck Boxwell chuck.boxwell@rnldesign.com Phil Allen Phil.Allen@RNLDESIGN.com Elias Escobar elias.escobar@rnldesign.com	213-955-9775 Fax 213-955-9885
Civil Engineer		
Mesiti-Miller Engineering 224 Walnut Avenue; Ste.B Santa Cruz, CA 95060	Mark Mesiti-Miller mark@mme.com Jim Putnam jim@m-me.com	831-426-3186 Fax 831-426-6607
Landscape Architect		
Joni L. Janecki & Associates 303 Potrero Street; Ste. 16 Santa Cruz, CA 95060	Joni Janecki jlj@jlja.com Nicole Steel njs@jlja.com	831-423-6040 Fax 831-423-6054
Structural Engineer		
Mesiti-Miller Engineering 224 Walnut Avenue; Ste.B Santa Cruz, CA 95060	Mark Mesiti-Miller mark@mme.com Dale Hendsbee dale@m-me.com	831-426-3186 Fax 831-426-6607
Maintenance Equipment Consultant		
Maintenance Design Group 55 Waugh Drive; Ste. 800 Houston, TX 77007	Mark Ellis ellisma@c-b.com James Bond	713-803-2350 Fax 713-869-2556
Security / Data Consultant		
TEECOM 333 Broadway; Ste. 601 Oakland, CA 94612-1906	David Marks david.marks@teecom.com Mark Latz, Telecommunications mark.latz@teecom.com Teresa Abrahamson, Security teresa.abrahamson@teecom.com	510-337-2800 Fax 510-337-2804
Mechanical Engineer		
Carter Burgess Frank H. Ogawa Plaza; Ste. 10 Oakland, CA 94612	Darin Stuart stuardl@c-b.com	510-457-0027 Fax 510-457-0037

Electrical Engineer

Carter Burgess
Frank H. Ogawa Plaza; Ste. 10
Oakland, CA 94612

Darin Stuart
stuardl@c-b.com

510-457-0027
Fax 510-457-0037

Geotechnical Consultant

Cotton Shires & Associates
330 Village Lane
Los Gatos, CA 95030-7218

Pat Shires
David Schrier
dschrier@conttonshires.com

408-354-5542
Fax 408-354-1852

END OF DOCUMENT 00060

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- 02763 PAVEMENT MARKINGS AND STRIPING ^[RNL]
- 02810 AUTOMATIC IRRIGATION SYSTEM
- 02825 SOUND BARRIER WALL PANELS ^[RNL]
- 02830 CHAIN LINK FENCING
- 02840 SIGNAGE ^[RNL]
- 02920 SOIL PREPARATION ^[JLJ]
- 02950 PLANTING ^[JLJ]
- 02970 LANDSCAPE MAINTENANCE ^[JLJ]

DIVISION 3 - CONCRETE

- 03100 CONCRETE FORMWORK ^[MME]
- 03200 CONCRETE REINFORCEMENT ^[MME]
- 03300 CAST-IN-PLACE CONCRETE ^[MME]
- 03360 CONCRETE HARDENER AND SLIP RESISTANT FINISHES ^[RNL]
- 03470 TILT-UP PRECAST CONCRETE ^[MME]

DIVISION 4 - MASONRY

- 04200 UNIT MASONRY ^[MME]

DIVISION 5 - METALS

- 05120 STRUCTURAL STEEL ^[MME]
- 05200 STEEL JOISTS ^[MME]
- 05310 STEEL DECK ^[MME]
- 05500 METAL FABRICATIONS ^[RNL]
- 05511 METAL STAIRS ^[RNL]
- 05521 PIPE AND TUBE RAILINGS ^[RNL]
- 05522 HEAVY DUTY MODULAR RAILINGS ^[RNL]
- 05530 GRATINGS ^[RNL]
- 05700 - PERFORATED SHEET METAL ^[RNL]

DIVISION 6 - WOOD AND PLASTICS

- 06105 MISCELLANEOUS CARPENTRY ^[RNL]
- 06402 INTERIOR ARCHITECTURAL WOODWORK ^[RNL]

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

- 07115 BITUMINOUS DAMPPROOFING ^[RNL]
- 07190 WATER REPELLENTS ^[RNL]
- 07210 BUILDING INSULATION ^[RNL]
- 07422 GLASS-FIBER-REINFORCED PLASTIC GRATING WALL PANELS ^[RNL]
- 07511 BUILT-UP ASPHALT ROOFING ^[RNL]
- 07610 SHEET METAL ROOFING ^[RNL]
- 07620 SHEET METAL FLASHING AND TRIM ^[RNL]
- 07720 ROOF HATCHES ^[RNL]
- 07770 ROOF SCREEN WALL SUPPORT ^[RNL]
- 07841 THROUGH-PENETRATION FIRESTOP SYSTEMS ^[RNL]
- 07842 FIRE RESISTIVE JOINT SYSTEMS ^[RNL]
- 07920 JOINT SEALANTS ^[RNL]

DIVISION 8 - DOORS AND FRAMES

- 08111 STANDARD STEEL DOORS AND FRAMES ^[RNL]
- 08114 CUSTOM STEEL DOORS AND FRAMES ^[RNL]
- 08311 ACCESS DOORS AND FRAMES ^[RNL]
- 08331 EXTERIOR OVERHEAD COILING DOORS ^[RNL]
- 08332 INTERIOR OVERHEAD COILING DOORS ^[RNL]
- 08348 FIBERGLASS REINFORCED DOOR AND DOOR FRAME SYSTEMS ^[RNL]
- 08362 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS ^[RNL]
- 08411 ALUMINUM-FRAMED WINDOWS ^[RNL]
- 08710 DOOR HARDWARE ^[RNL]
- 08800 GLAZING ^[RNL]
- 08840 PLASTIC GLAZING ^[RNL]
- 08950 POLYCARBONATE GLAZED WALL ASSEMBLIES ^[RNL]

DIVISION 9 - FINISHES

- 09220 PORTLAND CEMENT PLASTER (STUCCO) ^[RNL]
- 09260 GYPSUM BOARD ASSEMBLIES ^[RNL]
- 09310 CERAMIC TILE ^[RNL]
- 09511 ACOUSTICAL PANEL CEILINGS ^[RNL]
- 09610 CONCRETE MOISTURE VAPOR EMISSION AND pH TESTING ^[RNL]
- 09611 FLUID APPLIED CONCRETE SEALER, DENSIFIER AND HARDENER ^[RNL]
- 09612 SLIP RESISTANT STAIR TREAD STRIPING ^[RNL]
- 09653 RESILIENT WALL BASE AND ACCESSORIES ^[RNL]
- 09654 LINOLEUM FLOOR COVERINGS ^[RNL]
- 09671 ACID RESISTANT RESINOUS FLOORING ^[RNL]
- 09910 - INTERIOR PAVEMENT MARKING ^[RNL]
- 09911 EXTERIOR PAINTING ^[RNL]
- 09912 INTERIOR PAINTING ^[RNL]

INTRODUCTORY INFORMATION

- 00005 CERTIFICATIONS PAGE *[RNL]*
- 00006 PROJECT DIRECTORY *[RNL]*
- 00010 TABLE OF CONTENTS *[RNL]*

DIVISION 10 - SPECIALTIES

- 10101 MARKERBOARDS *[RNL]*
- 10195 CHASSIS WASH CURTAINS AND CURTAIN TRACKS *[RNL]*
- 10440 INTERIOR BUILDING SIGNAGE *[RNL]*
- 10505 METAL LOCKERS *[RNL]*
- 10520 FIRE EXTINGUISHERS AND BRACKETS *[RNL]*
- 10605 CHAIN-LINK PARTITIONS AND GATES *[RNL]*
- 10670 STORAGE EQUIPMENT *[MDG]*
- 10801 TOILET ROOM ACCESSORIES *[RNL]*

DIVISION 11 - EQUIPMENT

- 11020 FIRE DEPARTMENT KEY BOX *[RNL]*
- 11132 FIXED PROJECTION SCREENS *[RNL]*
- 11140 VEHICLE SERVICE EQUIPMENT *[MDG]*
- 11510 SHOP EQUIPMENT *[MDG]*
- 11515 FABRICATED EQUIPMENT *[MDG]*

DIVISION 12 - FURNISHINGS (Not Used)

DIVISION 13 - SPECIAL CONSTRUCTION

- 13700 BASIC SECURITY SYSTEM REQUIREMENTS *[TCM]*
- 13720 VIDEO SURVEILLANCE *[TCM]*
- 13770 SECURITY SYSTEM CABLING *[TCM]*
- 13780 SECURITY SYSTEM LABELING *[TCM]*
- 13790 SECURITY SYSTEM COMMISSIONING *[TCM]*
- 13930 FIRE PROTECTION SYSTEMS *[C&B]*

DIVISION 14 - CONVEYING SYSTEMS

- 14240 HYDRAULIC ELEVATORS *[RNL]*
- 14450 VEHICLE LIFTS *[MDG]*
- 14600 HOISTS AND CRANES *[MDG]*

DIVISION 15 - MECHANICAL

- 15050 MECHANICAL GENERAL PROVISIONS *[CB]*
- 15051 SUBMITTALS *[CB]*
- 15052 OPERATION AND MAINTENANCE MANUALS *[CB]*
- 15060 HANGERS AND SUPPORTS *[CB]*
- 15070 VIBRATION ISOLATION *[CB]*
- 15075 MECHANICAL IDENTIFICATION *[CB]*

(DIVISION 15 - MECHANICAL continued)

- 15081 DUCT INSULATION ^[CB]
- 15083 PIPING INSULATION ^[CB]
- 15140 DOMESTIC WATER AND SANITARY DRAINAGE PIPING ^[CB]
- 15160 STORM DRAINAGE PIPING ^[CB]
- 15184 REFRIGERATION PIPING AND SPECIALTIES ^[CB]
- 15190 FUEL PIPING ^[CB]
- 15410 PLUMBING FIXTURES ^[CB]
- 15480 DOMESTIC WATER HEATERS ^[CB]
- 15530 LOW INTENSITY UNITARY HEATER ^[CB]
- 15550 FLUE PIPE ^[CB]
- 15732 PACKAGED ROOFTOP AIR CONDITIONING UNITS ^[CB]
- 15740 SPLIT SYSTEM HEAT PUMPS ^[CB]
- 15810 DUCTS ^[CB]
- 15820 DUCT ACCESSORIES ^[CB]
- 15834 CENTRIFUGAL FANS ^[CB]
- 15836 POWER VENTILATORS ^[CB]
- 15837 VEHICLE EXHAUST SYSTEM ^[CB]
- 15850 AIR OUTLETS AND INLETS ^[CB]
- 15862 AIR FILTERS ^[CB]
- 15900 CONTROLS ^[CB]
- 15910 GAS MONITORING SYSTEM CONTROLS ^[CB]
- 15950 TESTING, ADJUSTING, AND BALANCING ^[CB]

DIVISION 16 - ELECTRICAL

- 16050 ELECTRICAL GENERAL PROVISIONS ^[CB]
- 16051 SUBMITTALS ^[CB]
- 16052 OPERATION AND MAINTENANCE MANUALS ^[CB]
- 16053 ELECTRICAL SYSTEM COORDINATION STUDY ^[CB]
- 16054 ELECTRICAL DEMOLITION ^[CB]
- 16060 GROUNDING AND BONDING SYSTEMS ^[CB]
- 16061 TELECOMMUNICATIONS GROUNDING BACKBONE ^[CB]
- 16070 SUPPORTING DEVICES ^[CB]
- 16071 SEISMIC CONTROLS FOR ELECTRICAL WORK ^[CB]
- 16075 ELECTRICAL IDENTIFICATION ^[CB]
- 16080 ELECTRICAL TESTING ^[CB]
- 16091 WORK IN EXISTING BUILDING ^[CB]
- 16120 WIRE AND CABLE ^[CB]
- 16130 BOXES ^[CB]
- 16132 CONDUIT ^[CB]
- 16133 WIREWAYS ^[CB]
- 16140 WIRING DEVICES ^[CB]
- 16150 WIRE CONNECTIONS AND DEVICES ^[CB]
- 16210 SERVICE ENTRANCE ^[CB]
- 16231 ENGINE GENERATOR ^[CB]
- 16276 DRY TYPE TRANSFORMERS ^[CB]
- 16336 TRANSIENT VOLTAGE SURGE SUPPRESSORS ^[CB]
- 16411 DISCONNECT SWITCHES ^[CB]
- 16423 CONTACTORS ^[CB]
- 16424 INDIVIDUAL MOTOR STARTERS ^[CB]
- 16441 SWITCHBOARDS ^[CB]

(DIVISION 16 - ELECTRICAL continued)

- 16442 PANELBOARDS ^[CB]
- 16491 FUSES ^[CB]
- 16510 LIGHTING FIXTURES - BUILDING ^[CB]
- 16520 LIGHTING FIXTURES - SITE ^[CB]
- 16530 EMERGENCY LIGHTING ^[CB]
- 16700 TELECOMMUNICATIONS BASIC REQUIREMENTS ^[TGD]
- 16705 TELECOMMUNICATIONS EQUIPMENT ROOMS ^[TGD]
- 16706 TELECOMMUNICATIONS BONDING ^[TGD]
- 16708 TELECOMMUNICATIONS PATHWAYS ^[TGD]
- 16710 TELECOMMUNICATIONS HORIZONTAL CABLING ^[TGD]
- 16719 TELECOMMUNICATIONS TESTING ^[TGD]
- 16720 FIRE ALARM SYSTEMS ^[CB]
- 16900 LIGHTING CONTROL SYSTEMS ^[CB]

END OF DOCUMENT 00010

SECTION 01100

SUMMARY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by Contract Documents.
 - 2. Contract.
 - 3. Work sequence.
 - 4. Use of premises.
 - 5. Owner-furnished products.
 - 6. Specification formats and conventions.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of new operations, maintenance and servicing facilities for the Santa Cruz Metropolitan Transit District.
 - 1. Project Location: At intersection of Golf Club Drive and River Street in Santa Cruz, California.
 - 2. Owner: Santa Cruz Metropolitan Transit District.
- B. Architect Identification: The Contract Documents, dated June 29, 2006, were prepared for Project by RNL Design; 800 Wilshire Boulevard; Suite 400; Los Angeles, CA 90017.
- C. Construction Manager: A Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor, according to a separate contract between Owner and Construction Manager.
- D. The Work consists of a new wash and fueling services building, and related site work.
 - 1. The Work includes the following:
 - a. Installation of Owner provided fueling tanks.
 - b. Cutting, patching and selective building demolition.
 - c. Site preparation, clearing and protection.
 - d. Site work including earthwork, erosion control, utilities, asphalt and concrete pavements, irrigation, ornamental and chainlink fencing, and landscaping.
 - e. Cast-in-place concrete work including footing and driven pile foundations, slabs-on-grade, columns, beams and decks.
 - f. Site and building masonry work.
 - g. Steel structure, joists, decking, railings, stairs, gratings and miscellaneous fabrications.

- h. Miscellaneous interior carpentry, architectural woodwork and casework.
- i. Dampproofing and water repellent coatings.
- j. Building insulation.
- k. Metal roof panels, flashing and trim.
- l. Cementitious panel siding.
- m. Built-up low slope roofing (CRRC certified Cool Roof).
- n. Sealants and firestopping.
- o. Metal doors, frames, and windows; coiling overhead doors; glazed and unglazed; door hardware.
- p. Gypsum sheathing, partitions and ceilings.
- q. Floor, wall and ceiling finishes including ceramic tile, acoustic panels, sealers, resilient base and accessories, paints and other coatings.
- r. Louvers, lockers, fire extinguishers, and storage equipment; toilet room accessories.
- s. Vehicle service, wash and shop equipment.
- t. Security, access control and video surveillance systems.
- u. Compressed and Liquid Natural Gas (CNG & LNG) storage and fueling equipment.
- v. Mechanical HVAC, plumbing, fire protection and shop utility systems.
- w. Electrical service, emergency service, power, lighting, communications, data, fire alarm and gas detection systems.

1.04 CONTRACT

- A. Project will be constructed under a general construction contract.

1.05 WORK SEQUENCE

- A. The Work shall be conducted in 1 phase.

1.06 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.07 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish the following equipment.
 - 1. CNG Storage Vessel Assembly (see Appendix for specifications).
 - 2. LNG Storage Tank (see Appendix for specifications).
- B. The Work includes providing support systems to receive Owner's equipment and plumbing, mechanical, and electrical connections.
 - 1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
 - 3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.

4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.

1.08 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
 1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
- C. Specification Revisions: From time to time these Specifications may be revised to indicate changes to the Contract Requirements. The following conventions will be used to indicate changes to these Specifications. The Contractor shall post the changes on the Record Specifications.
 1. Revision number, date and other information indicating how specification changes are issued to Contractor will be indicated in the upper right-hand corner of header of each section.

2. Language added to these Specifications will be underlined (underlined).
3. Language deleted from these Specification will be struck out (~~struck out~~).
4. Language added and deleted will be indicated by vertical bar on right margin of page (|).
5. Revised specifications may be issued to Contractor by one or more of the following means:
 - a. A complete section including all pages showing changes as well as those not showing changes, usually when revisions are extensive and when page numbering changes.
 - b. Selected pages of a section where revisions do not change pagination.
 - c. Abbreviated section showing language that has been revised and showing additional language for context (to help the reader locate language that has been revised). Language not shown shall remain as indicated on previous versions of the section. Abbreviated sections are issued usually when revisions are indicated on few pages of the complete version of the section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01250

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing the following types of Contract modifications:
 - 1. Minor changes in the Work.
 - 2. Proposal requests.
 - 3. Change order procedures.
 - 4. Construction change authorization.
- B. Related Sections include the following:
 - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.03 MINOR CHANGES IN THE WORK

- A. Architect will issue through Construction Manager supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included at end of Part 3.

1.04 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Construction Manager are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity

duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Construction Manager.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: For Change Order proposals, form, sample of which is included at end of this Section.

1.05 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on form acceptable to Owner.

1.06 CONSTRUCTION CHANGE AUTHORIZATION

- A. Construction Change Authorization: Construction Manager may issue a Construction Change Authorization on form included at end of Part 3. Construction Change Authorization instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Authorization contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Authorization.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)



RNL Interplan, Inc.
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Denver
 Phoenix
 Orange County
 Los Angeles

**Architects
 Supplemental
 Instructions**

Distribute to Following:
 Owner
 Architect
 Consultant(s):
 Contractor
 Field:

Project:	Metrobase Project	ASI No.:	
Owner:	Santa Cruz Metropolitan Transit District 370 Encinal Street; Ste. 100 Santa Cruz, CA 95060	Date of Issuance:	
To:		Architect:	RNL Interplan, Inc. 800 Wilshire Boulevard Suite 400 Los Angeles, California 90017
Contractor		Contractor's Project No.:	6040-1569-01
Contract For:	Metrobase Project	Architect's Project No.:	6040-1569-01

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in [Contract Sum or Guaranteed Maximum Price] or Contract Time. Prior to proceeding in accordance with these instructions, indicate your acceptance of these instructions for minor change to the Work as consistent with the Contract Documents and return a copy to the Architect.

Description:

Attachment(s):

Issued By:	Accepted By:	
_____	_____	_____
Architect	Contractor	Date

END OF ASI



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 A California Corporation
 800 Wilshire Boulevard • Suite 400 • Los Angeles, California 90017
 213.955.9775 • fax 213.955.9885 • www.rnldesign.com

Denver
 Phoenix
 Orange County
 Los Angeles

Proposal Request

Distribute to Following:
 Owner
 Architect
 Consultant(s):
 Contractor:
 Field:
 Other:

Project: Metrobase Project

PR No.:

Owner: Santa Cruz Metropolitan Transit
 District
 370 Encinal Street; Ste. 100
 Santa Cruz, CA 95060

Date of Issuance:

To:
 Contractor

Architect: RNL Interplan, Inc.
 800 Wilshire Boulevard
 Suite 400
 Los Angeles, California 90017

Contract For: Metrobase Project

Architect's Project No.: 6040-1569-01

Please submit an itemized quotation for changes in the Contract Sum and/or Time incidental to proposed modifications to the Contract Document described herein. You shall not to proceed with this Work unless otherwise noted below.

This is not a change order or a direction to proceed with the work. Any cost and/or time change associated with this work is subject to review by the Architect and acceptance by the Owner.

Referenced Documents:

Description:

Attachment(s):

Requested By:

Architect

END OF PR



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 Phoenix
 Orange County
 Los Angeles

**Construction
 Change
 Authorization**

Distribute to Following:

- Owner
- Architect
- Consultant(s):
- Contractor
- Field:

Project: Metrobase Project CCA No.:

Owner: Santa Cruz Metropolitan Transit District
 370 Encinal Street; Ste. 100
 Santa Cruz, CA 95060 Date of Issuance:

To: Contractor Architect: RNL Interplan, Inc.
 800 Wilshire Boulevard
 Suite 400
 Los Angeles, California 90017

Contract For: Metrobase Project Architect's Project No.: 6040-1569-01

In order to expedite the Work and avoid or minimize delays in the Work which may affect [Contract Sum or Guaranteed Maximum Price] or Contract Time, the Contract Documents are hereby amended as described below. Proceed with this Work promptly. Submit final costs for Work involved and change in Contract Time (if any), for inclusion in a subsequent Change Order.

Description:

Attachment(s):

The following is based on information provided by the Contractor:

Method of Determining Change in the [Contract Sum or Guaranteed Maximum Price] [lump sum, unit price, cost plus fee or other _____].
 Change in Contract Amount: _____ per _____ [fixed, estimated or maximum] [increase or decrease].
 Change in Contract Time: ____ days [increase or decrease].

Issued By:	Confirmed By:	Authorized By:
_____	_____	_____
Date	Date	Date
Architect	Owner	Contractor

END OF CCA

END OF SECTION 01250

SECTION 01290

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.
 - 1. Invitation For Bids (IFB), "Part IV General Conditions To The Contract," Paragraph "11. Prompt Payment" for Owner payment and retainage to General Contractor.
 - 2. Invitation For Bids (IFB), "Part V Special Conditions Of The Contract," Paragraph "5. State Contract Provisions," Subparagraph " 5.03 Contractor shall establish . . ." for General Contractor cost accounting requirements.
 - 3. Invitation For Bids (IFB), "Part VI Contract For The Construction Of . . .," Paragraph "4. Compensation" for terms of payment to General Contractor and General Contractor invoicing requirements.
 - 4. Invitation For Bids (IFB), "Part VII Federal Transit Administration Requirements For Construction Contracts," Paragraph "3.0 Equal Employment Opportunity," Subparagraph "3.1 Nondiscrimination," Sub-subparagraph "(8) The prime contractor . . ." for General Contractor payment and retainage to subcontractors.
 - 5. Invitation For Bids (IFB), "Part VII Federal Transit Administration Requirements For Construction Contracts," Paragraph "8.0 Labor Provisions . . .," Subparagraph "8.2 Withholding" for payment withholding requirements.
 - 6. Invitation For Bids (IFB), "Part VII Federal Transit Administration Requirements For Construction Contracts," Paragraph "8.0 Labor Provisions . . .," Subparagraph "8.3 Payrolls and Basic Records" for payroll submittal requirements.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.03 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.04 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - 2. Submit the Schedule of Values to Architect through Construction Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.05 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Coordination Drawings.
 - 3. Administrative and supervisory personnel.
 - 4. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.03 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.

1.04 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Refer to Division 15 Section "Basic Mechanical Materials and Methods" and Division 16 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.
- B. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.06 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, if one is retained by Owner, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Construction Manager, if one is retained by Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. Conduct preinstallation conferences concurrently with Project Meetings.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction Manager, if one is retained by Owner, of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.

- h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements.
 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at biweekly intervals unless directed otherwise by the Owner. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Construction Manager, if one is retained by Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.

- 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Conduct Project coordination meetings concurrently with Project Meetings.
1. Attendees: In addition to representatives of Owner, Construction Manager, if one is retained by Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.
 - 1. Invitation For Bids (IFB), "Part II Instructions To Bidders," Paragraph "15. Execution Of Contract" for commencement of work requirements.
 - 2. Invitation For Bids (IFB), "Part V Special Conditions Of The Contract," Paragraph "6. Year 2000 Compliance" for requirements.
 - 3. Invitation For Bids (IFB), "Part VI Contract For The Construction Of . . .," Paragraph "3. Time Of Performance" for scheduling factors.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Special reports.
 - 8. Construction photographs.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
 - 4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.
 - 5. Division 1 Section "Execution Requirements" for Request For Interpretation form.
 - 6. Division 1 Section "Closeout Procedures" for submitting electronic photographic files as Project Record Documents at Project closeout.

1.03 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

2. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
 - C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
 - D. Event: The starting or ending point of an activity.
 - E. Float: The measure of leeway in starting and completing an activity.
 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
 - F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
 - G. Gantt Chart: A horizontal bar chart developed as a construction control tool for use in project management, a Gantt chart provides a graphical illustration of the schedule that helps to plan, coordinate, and track specific tasks in the project.
 - H. Major Area: A story of construction, a separate building, or a similar significant construction element.
 - I. Milestone: A key or critical point in time for reference or measurement.
 - J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.04 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Submittals Schedule: Submit 5 copies of schedule. Arrange the following information in a tabular format:
 1. Scheduled date for first submittal.
 2. Specification Section number and title.
 3. Submittal category (action or informational).
 4. Name of subcontractor.
 5. Description of the Work covered.

6. Scheduled date for Architect's and Construction Manager's final release or approval.
- C. Preliminary Construction Schedule: Submit 5 printed copies; one a single sheet of reproducible media, and one a print.
 - D. Preliminary Network Diagram: Submit printed copies; one a single sheet of reproducible media, and one a print; large enough to show entire network for entire construction period.
 - E. Contractor's Construction Schedule: Submit 5 printed copies of initial schedule, one a reproducible print and one a blue- or black-line print, large enough to show entire schedule for entire construction period.
 1. Submit an electronic copy of schedule, using software indicated, on 3-1/2-inch diskettes, formatted to hold 1.44 MB of data, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
 - F. CPM Reports: Concurrent with CPM schedule, submit 5 printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.
 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from execution of the Contract until most recent Application for Payment.
 - G. Construction Photographs: Submit 5 floppy diskettes or CD's of all digital photographs taken each month within seven days of end of month.
 1. Format: Digital electronic files in JPEG (*.jpg) or GIF (*.gif) format.
 2. Identification:
 - a. Electronic Files and Folders: Organized digital files with file names and in folders with the following information:
 - 1) Folder named by date that digital photographs were taken. Use one of the following formats: mm_dd_yy, mmm_dd_yyyy or yyyy_mm_dd.
 - 2) Within each date folder name files using descriptive text indicating vantage point, location, direction (by compass point), and elevation or story of construction. For example: "exterior_north_elevation.jpg," "interior_4th_floor_NE_corner_rm_445.gif" or "exterior_roof_west_parapet.jpg."
 3. Electronic Media: Label each floppy diskette or CD with the following information:
 - a. Name of Project.
 - b. Name of Architect and Construction Manager.

- c. Name of Contractor.
 - d. Beginning and ending dates digital photographs were taken.
- H. Daily Construction Reports: Submit 5 copies at weekly intervals.
 - I. Material Location Reports: Submit 5 copies at monthly intervals.
 - J. Field Condition Reports: Submit 5 copies at time of discovery of differing conditions.
 - K. Special Reports: Submit 5 copies at time of unusual event.

1.05 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting.
- B. Photographer Qualifications: An individual who has been trained to use the electronic photographic equipment and has a successful record of taking and printing acceptable pictures.
- C. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing work stages, area separations, interim milestones, and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.06 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the execution of Contract to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than 14 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Seasonal variations.
 - g. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
6. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the date of execution of Contract, Substantial Completion and Final Completion.
- F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 1. Refer to Division 1 Section "Payment Procedures" for cost reporting and payment procedures.

- G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules. Provide in format acceptable to Owner.

2.03 PRELIMINARY CONSTRUCTION SCHEDULE (GANTT-CHART)

- A. Gantt-Chart Schedule: Submit preliminary horizontal Gantt-chart-type construction schedule within 7 days of date established for execution of Contract.
- B. Preparing Gantt-Chart:
 - 1. Construct chart with a horizontal axis representing the total time span of the project, broken down into weekly increments and a vertical axis representing the tasks that make up the project.
 - 2. Indicate each significant construction activity separately for the total construction period.
 - 3. Horizontal bars of varying lengths shall represent the sequences, timing, and time span for each task.
 - 4. The bar spans may overlap.
- C. Include a separate line item indicating breakdown of the total work days and calendar days to complete the Work.

2.04 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.
 - 1. Base CPM schedule on the Preliminary Construction Schedule (Gantt Chart) and whatever updating and feedback was received since the start of Project.
 - 2. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for execution of Contract.
 - 3. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 4. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 5. Use "one workday" as the unit of time.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary construction schedule (Gantt Chart), prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

- a. Preparation and processing of submittals.
 - b. Purchase of materials.
 - c. Delivery.
 - d. Fabrication.
 - e. Installation.
2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- D. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the Schedule of Values).
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

- a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
- b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.05 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors and Owner's own forces at Project site.
 3. Approximate count of personnel at Project site.
 4. High and low temperatures and general weather conditions.
 5. Accidents.
 6. Meetings and significant decisions.
 7. Unusual events (refer to special reports).
 8. Stoppages, delays, shortages, and losses.
 9. Meter readings and similar recordings.
 10. Emergency procedures.
 11. Orders and requests of authorities having jurisdiction.
 12. Change Orders received and implemented.
 13. Construction Change Directives received.
 14. Services connected and disconnected.
 15. Equipment or system tests and startups.
 16. Partial Completions and occupancies.
 17. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a Request for Interpretation on form included at the end of Division 1 Section "Execution Requirements." Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.06 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Construction Manager,, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.02 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: A person under the supervision of the Contractor trained in the use of the digital camera equipment, the computer equipment used in downloading digital images and organizing the digital image files and folders, and the recording equipment used to create the electronic media for submitting and permanently storing the digital images.
- B. Photographic Medium: Color digital camera with the following minimum features:
 - 1. Image Size: 1280x960 or 1280 (3:2) or greater.
 - 2. Date and Time Function: Capable of imposing either date, hour and minute, or year, month and day on digital image.
- C. Date Stamp: Record date and time with each photograph image as it is being taken so stamp is integral with digital image file .
- D. Preconstruction Photographs: Before starting construction, take four color photographs of Project site and surrounding properties from different vantage points, as directed by Construction Manager. Show existing conditions adjacent to property.

- E. Periodic Construction Photographs: Take four color photographs monthly, coinciding with cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since last photographs were taken.
 - 1. Field Office Prints: Retain one set of prints of periodic photographs in field office at Project site, available at all times for reference. Identify photographs the same as for those submitted to Architect and Construction Manager.
- F. Final Completion Construction Photographs: Take eight color photographs after date of Substantial Completion for submission as Project Record Documents. Construction Manager will direct photographer for desired vantage points.

END OF SECTION 01320

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.
 - 1. Invitation For Bids (IFB), "Part II Instructions To Bidders," Paragraph "15. Execution Of Contract" for submitting insurance certificates.
 - 2. Invitation For Bids (IFB), "Part II Instructions To Bidders," Paragraph "21. Performance And Payment Bonds" for submitting bonds.
 - 3. Invitation For Bids (IFB), "Part IV General Conditions Of The Contract," Paragraph "13. Miscellaneous Provisions," Subparagraph "13.05 Publicity" for publicity submittal requirements.
 - 4. Invitation For Bids (IFB), "VII Federal Transit Administration Requirements For Construction Contracts," Paragraph "3.0 Equal Employment Opportunity," Subparagraph "3.2 Construction Contract Specifications," Sub-subparagraph "(14) The contractor shall . . ." for submitting reports related EEO policy implementation.
 - 5. Invitation For Bids (IFB), "VII Federal Transit Administration Requirements For Construction Contracts," Paragraph "8.0 Labor Provisions," Subparagraph "8.3 Payrolls and Basic Records" for submitting payroll reports to grantee.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.
 - 2. Division 1 Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule and construction photographs.
 - 4. Division 1 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals and for erecting mockups.
 - 5. Division 1 Section "Closeout Procedures" for submitting warranties, Project Record Documents and operation and maintenance manuals.

1.03 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's and Construction Manager's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Construction Manager's approval. Submittals may be rejected for not complying with requirements.

1.04 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings may be provided by Architect, at their discretion, for Contractor's use in preparing submittals.
 - 1. Unless otherwise arranged with the Architect, 1 CD ROM will be made available to the General Contractor at no charge and under the conditions of the "Transmittal of CAD Files To General Contractors, Subcontractors or Other Design Professionals" letter included at the end of Part 3.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for Architect's review shall commence on Architect's receipt of submittal.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.
 - a. All Division 2 Sections.
 - b. All Division 3 Sections except Section "CONCRETE HARDENER FINISHES."
 - c. All Division 4 Sections.
 - d. Division 5 Sections limited to the following:
 - 1) STRUCTURAL STEEL.
 - 2) STEEL JOISTS.
 - 3) STEEL DECK.
 - e. Division 11 Sections limited to the following:
 - 1) VACUUM EQUIPMENT.
 - 2) VEHICLE SERVICE EQUIPMENT.

- 3) VEHICLE WASH EQUIPMENT.
 - 4) SHOP EQUIPMENT.
 - 5) FABRICATED EQUIPMENT.
- f. All Division 13 Sections.
 - g. All Division 15 Sections.
 - h. All Division 16 Sections.
3. If intermediate submittal is necessary, process it in same manner as initial submittal.
 4. Allow 15 days for processing each resubmittal.
 5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Construction Manager.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect and Construction Manager.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and Construction Manager will return submittals, without review, received from sources other than Contractor.
1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect and Construction Manager in connection with construction.

PART 2 - PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Number of Copies: Submit five copies of each submittal, unless otherwise indicated. Architect, through Construction Manager, will return four copies. Mark up and retain one returned copy as a Project Record Document.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.

- k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
- D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."
- E. Samples: Prepare physical units of materials or products, including the following:
- 1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
 - 2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - 3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - 4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

- a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
7. Number of Samples for Initial Selection: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
8. Number of Samples for Verification: Submit three sets of Samples. Architect and Construction Manager will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
9. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.

- G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."
- H. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.
- I. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- J. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."
- K. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."
- L. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 2. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

- F. **Manufacturer Certificates:** Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. **Material Certificates:** Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. **Material Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. **Preconstruction Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. **Compatibility Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. **Field Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- L. **Product Test Reports:** Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. **Research/Evaluation Reports:** Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- N. **Maintenance Data:** Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- O. **Design Data:** Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

- P. **Manufacturer's Instructions:** Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. **Insurance Certificates and Bonds:** Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. **Construction Photographs:** Comply with requirements in Division 1 Section "Construction Progress Documentation."

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. **Approval Stamp:** Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

- A. **General:** Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.

- B. **Action Submittals:** Architect and Construction Manager will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. **Reviewed.** Where the submittal is marked with this action, submittal may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
 2. **Rejected.** Where the submittal is marked with this action, do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.
 3. **Resubmit Specific Item(s) Noted.** Where the submittal is marked with this action, do not proceed with the Work covered by the submittal. Resubmit with information requested, or required by the Contract Documents, that indicates compliance with requirements.
 4. **Furnish with Changes Noted.** Where the submittal is marked with this action, submittal may proceed provided it complies with both Architect's and Construction Manager notations and corrections on the submittal and compliance with the Contract Documents.
 5. **Revise and Resubmit.** Where the submittal is marked with this action, do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Architect's and Construction Manager notations and corrections.
 6. **Transmitted with No Review Made:** Submittal will be marked with this action if the Architect judges the submittal to be for information only or is not required by the Contract Documents.
- C. **Informational Submittals:** Architect and Construction Manager will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- D. **Submittals not required by the Contract Documents** will not be reviewed and may be discarded.

END OF SECTION 01330

(See following pages for sample Transmittal of CAD Files agreement.)

TRANSMITTAL OF CAD FILES TO GENERAL CONTRACTORS, SUBCONTRACTORS OR OTHER DESIGN PROFESSIONALS

[Insert Current Date Here]

[Name of General Contractor]
[Address]

Re: Santa Cruz Metropolitan Transit District
370 Encinal Street; Ste. 100
Santa Cruz, California
RNL Design Project No.: 6040-1569-01

Dear _____:

At your request and with the approval of the Owner, RNL Design, P.C. ("RNL") will provide certain CAD files for your convenience, in the preparation of _____ [insert brief description of the intended use e.g., "shop drawings" or "for backgrounds"] and for the use of _____ [insert the name or group who are authorized to use the CAD files, e.g., "John Doe & Associates" or "your subcontractors, suppliers and materialmen"], solely for this particular purpose and subject to the following terms and conditions:

- A. RNL CAD files are compatible with [Architectural Desktop R3.3 ___]; operating on an [IBM-compatible P.C.]. RNL makes no representation as to the compatibility of these files beyond the specified release of the referenced software nor does RNL make any representation as to the compatibility of the files on any other software or hardware.
- B. Information contained on the CAD files are considered part of RNL's "instruments of professional service", require professional interpretation and judgment, and shall not be used by you for any purpose other than as specifically set forth hereinabove. It is agreed that this information shall not be used for any other purpose(s) such as other projects, for additions to this project or completion of this project by another professional, without the prior written approval of RNL Design. You have no right to assign, sell, transfer or convey this information except for the particular purposes and uses set forth herein. Any other use or reuse by you or by others who obtained the files directly or indirectly through you, will be at your sole risk and without any liability or legal exposure whatsoever to RNL. Furthermore, you agree, to the fullest extent permitted by law, to defend, indemnify and hold harmless RNL from all claims, damages, losses and expenses, including attorneys fees arising out of or resulting from your use of the CAD files. You further agree to make no claim and hereby waive, for yourself and your subcontractors, to the fullest extent permitted by law, any claim

or cause of action of any nature against RNL, its officers, directors, employees, agents or subconsultants which may arise out of, or in connection with, your use of the CAD files.

- C. RNL makes no representation regarding the accuracy or completeness of CAD files. Addenda information or revisions made after the date indicated on the CAD files not been incorporated and RNL assumes no responsibility by virtue of this Agreement to advise you of any subsequent amendments, revisions or addenda. These CAD files are not "Contract Documents". Significant differences may exist between these CAD files and similar Contract Documents due to addenda, change orders or other revisions. RNL makes no representation regarding the accuracy or completeness of CAD files. In the event that a conflict arises between the signed and sealed Contract Documents prepared by RNL and/or its subconsultants, and CAD files, the signed and sealed Contract Documents shall govern. You are responsible to determine if any conflict exists. By your use of these CAD files, you are not relieved of your duty, if any, to fully comply with the Contract Documents, including without limitation the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors, if any, and to fully and properly supervise your subcontractors.
- D. Due to the potential that the information contained on the CAD files can be modified unintentionally or otherwise, RNL reserves the right to remove all indicia of its ownership, authorship and/or involvement from each electronic display. However, by doing so, RNL does not waive, modify or limit its ownership, authorship or rights for purposes of the copyright or intellectual property laws, rules, regulations or procedures.
- E. RNL will furnish you with the electronic files of the following drawing sheets:
[List each sheet for which electronic media is provided]
- F. A service fee of \$_____ shall be remitted to RNL prior to delivery of the CAD files. Fee will be based on RNL employees billing rate times the amount of time it takes to produce the files requested. The minimum service fee will be \$200.00.
- G. No warranty, express or implied, including without limitation, the implied warranty of merchantability and fitness for a particular purpose is made respecting this Agreement or the CAD files.
- H. Any purchase order number provided by you is for your accounting purposes only. Purchase order terms and conditions are void, are expressed disclaimed and are not a part of this agreement.
- I. This is not a sale of RNL's copyrights. Nothing herein shall be interpreted or deemed to be a transfer of any of RNL's copyrights. Except for the specific uses

approved herein, no license, right or other uses are granted or implied by this Agreement. You may not assign, delegate, sublicense, pledge, or otherwise transfer any license or right granted herein to another party, except as specifically provided herein without the prior written approval of RNL.

- J. This is solely an agreement between your company and RNL. There are no third party beneficiaries to this agreement. However, you agree to impose the same limitations and conditions contained herein upon the use of the CAD files upon any of your subcontractors or consultants to which access is given to the CAD files provided under the terms of this Agreement.
- K. In the event of any litigation arising from or related to the terms of this Agreement, the prevailing party will be entitled to recovery of all reasonable costs incurred, including staff time, court costs, attorneys fees and other related expenses.
- L. The laws of Colorado shall govern this agreement.

AUTHORIZED ACCEPTANCE:

RNL Design, a Professional Corporation:

[Insert Name]

By

By

Title

Title

Date

Date

SAMPLE DOCUMENT

SECTION 01400

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.03 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.04 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.05 REGULATORY REQUIREMENTS

- A. Copies of Regulations: Obtain copies of the regulations indicated on the Drawings and retain at Project site to be available for reference by parties who have a reasonable need.

1.06 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- D. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Ambient conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

- H. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.
1. Contractor responsibilities include the following:
 - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. When testing is complete, remove assemblies; do not reuse materials on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect , through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
 2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.

1.08 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
 3. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 - a. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 1) Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

- b. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - c. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - d. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - e. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
- 1. Testing agency will notify Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 - 3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 5. Testing agency will retest and reinspect corrected work.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
- 1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 - 5. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for execution of Contract.
1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01420

REFERENCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.
 - 1. Invitation For Bids (IFB), "Part V Special Conditions Of The Contract," Paragraph "2. Definitions" for basic contract definitions.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Definitions.
 - 2. Standard references, abbreviations and acronyms for the following:
 - a. Industry organizations.
 - b. Code agencies.
 - c. Federal Government agencies.
 - d. State Government agencies.
 - e. City Government agencies including authorities having jurisdiction, building code contacts and utility company contacts.

1.03 DEFINITIONS

- A. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- B. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- C. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- D. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- E. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- F. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- G. "Provide": Furnish and install, complete and ready for the intended use.

- H. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- I. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- J. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.04 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.
- E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the

recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.05 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333

AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AAN	American Association of Nurserymen (See ANLA)	
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AFPA	American Forest & Paper Association (See AF&PA)	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association www.hardboard.org	(847) 934-8800
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300

AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666
ALSC	American Lumber Standard Committee	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANLA	American Nursery & Landscape Association (Formerly: AAN - American Association of Nurserymen) www.anla.org	(202) 789-2900
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts www.aosaseed.com	(505) 522-1437
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(941) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCA	Architectural Spray Coaters Association www.ascassoc.com	(609) 848-6120
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722

ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (See WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association www.awpa.com	(817) 326-6300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CCFSS	Center for Cold-Formed Steel Structures www.umn.edu/~ccfss	(573) 341-4471
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333

CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CGSB	Canadian General Standards Board www.pwgsc.gc.ca/cgsb	(819) 956-0425
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040

FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org	(216) 241-7333
FGMA	Flat Glass Marketing Association (See GANA)	
FM	Factory Mutual System (See FMG)	
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FSC	Forest Stewardship Council www.fscoax.org	52 951 5146905
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANNA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/ganna	(785) 271-0208
GRI	Geosynthetic Research Institute www.drexel.edu/gri	(215) 895-2343
GTA	Glass Tempering Division of Glass Association of North America (See GANA)	
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (See CSA)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830

IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance (The) www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISSFA	International Solid Surface Fabricators Association	(702) 567-8150
I3A	International Imaging Industry Association (Formerly: PIMA - Photographic & Imaging Manufacturers Association) www.pima.net	(914) 698-7603
ITS	Intertek Testing Services www.itsglobal.com	(800) 345-3851 (607) 753-6711
IWS	Insect Screening Weavers Association (Now defunct)	
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Formerly: ALA - American Laminators Association) www.lma.org	(201) 664-2700
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
LSGA	Laminated Safety Glass Association (See GANA)	
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610

MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(614) 228-6194
ML/SFA	Metal Lath/Steel Framing Association (See SSMA)	
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NAAMM	North American Association of Mirror Manufacturers (See GANA)	
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NAMI	National Accreditation and Management Institute, Inc.	(304) 258-5100
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(414) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901

NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-6372
NGA	National Glass Association www.glass.org	(703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSA	National Stone Association (See NSSGA)	
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association (Formerly: NSA - National Stone Association) www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com	(800) 323-9736 (703) 779-1022
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (703) 359-0826

PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (508) 230-3516
PGI	PVC Geomembrane Institute //pgi-tp.ce.uiuc.edu	(217) 333-3929
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	Contact by mail only
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabfurn.com	(516) 294-5424
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIGMA	Sealed Insulating Glass Manufacturers Association (See IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.screenmfgassociation.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPI/SPFD	Society of the Plastics Industry (The) Spray Polyurethane Foam Division (See SPFA)	

SPRI	SPRI (Single Ply Roofing Institute) www.spri.org	(781) 444-0242
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TPI	Truss Plate Institute	(608) 833-5900
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 705-9898
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USITT	United States Institute for Theatre Technology, Inc. www.culturenet.ca/usitt	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651

WCMA	Window Covering Manufacturers Association (See WCSC)	
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	(909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-0990
DOC	Department of Commerce www.doc.gov	(202) 482-2000
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
LBL	Lawrence Berkeley Laboratory (See LBNL)	

LBNL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-5605
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CAPUC	(See CPUC)	
CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Products Laboratory //txforests-service.tamu.edu	(936) 639-8180

- F. City Government Agencies: Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. Building Codes:

Code Type	Code Model	Amendment Contact
Building/Dwelling Code	California Building Code 2002	
Structural Code	California Building Code 2002	
Plumbing Code	California Plumbing Code 2001	
Mechanical Code	California Mechanical Code 2001	

Code Type	Code Model	Amendment Contact
Electrical Code	California Electrical Code 2001	
Fire/Life Safety Code	California Fire Code 2002	
Accessibility Code	California Building Code 1998 (Title 24, Part 2)	California Access Compliance, (916) 327-9698
Energy Code	California Energy Code 1998 (Title 24, Part 6)	www.icbo.org and online for download
Elevator Code	California Elevator Safety Construction Code 1998 (Title 24, Part 7)	ICBO or (800) 423-6587

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.
 - 1. Invitation For Bids (IFB), "Part VII Federal Transit Administration Requirements For Construction Contract," Paragraph "3.2 Construction Contract Specifications, Sub-subparagraph "b." "(7)" "(n) Ensure that all facilities . . ." for segregation of hygiene facilities.
 - 2. Invitation For Bids (IFB), "Part VII Federal Transit Administration Requirements For Construction Contract," Paragraph "17.0 Project Signs" for project signage requirements.

1.02 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sewers and drainage.
 - 2. Water service and distribution.
 - 3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 4. Heating and cooling facilities.
 - 5. Ventilation.
 - 6. Electric power service.
 - 7. Lighting.
 - 8. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads and paving.
 - 2. Dewatering facilities and drains.
 - 3. Project identification and temporary signs.
 - 4. Waste disposal facilities.
 - 5. Field offices.
 - 6. Storage and fabrication sheds.
 - 7. Lifts and hoists.
 - 8. Temporary elevator usage.
 - 9. Temporary stairs.
 - 10. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Site enclosure fence.

5. Security enclosure and lockup.
6. Barricades, warning signs, and lights.
7. Temporary enclosures.
8. Fire protection.

E. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
2. Division 1 Section "Execution Requirements" for progress cleaning requirements.
3. Division 2 Section "Erosion Control" for disposal of ground water at Project site.
4. Division 2 Section "Asphalt Concrete Paving" for construction and maintenance of asphalt paving for temporary roads and paved areas.
5. Division 2 Section "Site Portland Cement Concrete Pavement" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.
6. Divisions 2 through 16 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.03 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.04 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
1. Owner's construction forces.
 2. Occupants of Project.
 3. Architect.
 4. Testing agencies.
 5. Personnel of authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.
- C. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site. If connecting to Owner's existing service include meter to monitor and record usage.
- D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site. If connecting to Owner's existing service include meter to monitor and record usage.

1.05 SUBMITTALS

- A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.06 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.07 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
 - 1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 - 1. Keep temporary services and facilities clean and neat.
 - 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Chain-Link Fencing: Minimum 2-inch , 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch-OD top rails.

- C. Lumber and Plywood: Comply with requirements in Division 6 Section "Miscellaneous Carpentry."
- D. Paint: Comply with requirements in Division 9 Section "Painting."
- E. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- F. Water: Potable.

2.02 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: Prefabricated or mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations" for classification, extinguishing agent, and size required by location and class of fire exposure.
- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
 - 1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 - 2. Connect temporary sewers to municipal system as directed by sewer department officials.
 - 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
 - 4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.
- C. Water Service:
 - 1. Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 - 2. Provide rubber hoses as necessary to serve Project site.
 - 3. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.
 - 4. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

- D. **Sanitary Facilities:** Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. **Disposable Supplies:** Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. **Toilets:** Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.
 3. **Wash Facilities:** Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 4. **Drinking-Water Facilities:** Provide bottled-water, drinking-water units.
 5. Locate toilets and drinking-water fixtures so personnel need not walk more than 200 feet (60 m) horizontally to facilities.
- E. **Heating and Cooling:** Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.
1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.
- F. **Ventilation and Humidity Control:** Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. **Electric Power Service:** Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
1. Install electric power service underground, unless overhead service must be used.
 2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
 3. Connect temporary service to Owner's existing power source, as directed by electric company officials.
- H. **Electric Distribution:** Provide receptacle outlets adequate for connection of power tools and equipment.
1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

2. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 3. Provide metal conduit enclosures or boxes for wiring devices.
 4. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Provide one 100-W incandescent lamp per 500 sq. ft., uniformly distributed, for general lighting, or equivalent illumination.
 3. Provide one 100-W incandescent lamp every 50 feet in traffic areas.
 4. Provide one 100-W incandescent lamp per story in stairways and ladder runs, located to illuminate each landing and flight.
 5. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.
- J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.
1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's/Owner Project Manager's office.
 - g. Principal subcontractors' field and home offices.
 3. Provide an answering machine, voice-mail service or messaging service on superintendent's telephone.
 4. Provide a portable cellular telephone for superintendent's use in making and receiving telephone calls when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas within construction limits indicated on Drawings.
1. Provide a reasonably level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
 2. Provide gravel paving course of subbase material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
 3. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- D. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
- E. Project Identification and Temporary Signs: Prepare Project identification and other signs as indicated.
1. Signs and Notices:
 - a. Provide all emergency notices, signs and safeguards required by law and ordinance, and as required to direct vehicular and pedestrian traffic. No advertisements, including contractor and subcontractor advertisements, will be permitted on the Project site without approval of the Owner.
 - b. Provide directional and warning signs where required.
 - c. Provide signs to inform public and persons seeking entrance to Project. Include signage directing construction deliveries to Contractor's designated storage and staging areas. Signage shall include Contractor's telephone number.
 - d. All signage including sizes, colors, graphic and textual content shall be approved by the Owner. Do not permit installation of unauthorized signs.

2. Sign Fabrication: Use commercially produced signage as available and comply with the following for custom signage:
 - a. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
 - b. Prepare temporary signs to provide directional information to construction personnel and visitors.
 - c. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
 - d. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.

- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
 1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
 2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

- G. Janitorial Services: Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.

- H. Common-Use Field Office: Provide an insulated, weathertight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of 10 persons at Project site. Keep office clean and orderly.
 1. Furnish and equip offices as follows:
 - a. Desk and four chairs, four-drawer file cabinet, a plan table, a plan rack, and bookcase.
 - b. Water cooler and private toilet complete with water closet, lavatory, and medicine cabinet with mirror.
 - c. Coffee machine and supplies, including regular and decaffeinated coffee, filters, cups, stirring sticks, creamer, sugar, and sugar substitute.
 - d. Provide a room of not less than 240 sq. ft. for Project meetings. Furnish room with conference table, 12 folding chairs, and 4-foot- square tack board.
 2. Provide resilient floor covering and painted gypsum wallboard walls and acoustical ceiling. Provide operable windows with adjustable blinds and insect screens.
 3. Provide an electric heater with thermostat capable of maintaining a uniform indoor temperature of 68 deg F. Provide an air-conditioning unit capable of maintaining an indoor temperature of 72 deg F.
 4. Provide fluorescent light fixtures capable of maintaining average illumination of 20 fc at desk height. Provide 110- to 120-V duplex outlets spaced at not more than 12-foot intervals, 1 per wall in each room.

- I. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.
 - 1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.
 - 2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.
- J. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Temporary Elevator Usage: Refer to Division 14 Sections for temporary use of new elevators.
- L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.
- B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.
- D. Tree and Plant Protection: Comply with requirements in Division 2 Section "Existing Plants To Remain."
- E. Site Enclosure Fence: Before construction operations begin install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
 - 1. Set fence posts in compacted mixture of gravel and earth or in concrete bases.
 - 2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
 - 3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

- F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- G. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
 - 1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
 - 3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
 - 4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
 - 5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.
- I. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA “241 Standard for Safeguarding Construction, Alterations and Demolition Operations.”
 - 1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
 - a. Field Offices: Class A stored-pressure water-type extinguishers.
 - b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures, but not less than 4-A:60-B:C, 10-lb.
 - c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor for each 2,500 square feet of floor areas or less, and at or near each usable stairwell.
 - 2. Store combustible materials in containers in fire-safe locations.
 - a. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.

3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
4. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
5. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
6. Provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
7. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 1 Section "References" for applicable industry standards for products specified.
 - 2. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
 - 3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.03 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and

other characteristics for purposes of evaluating comparable products of other named manufacturers.

- D. **Manufacturer's Warranty:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- E. **Special Warranty:** Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.04 SUBMITTALS

- A. **Substitution Requests:** Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. **Substitution Request Form:** Use form provided at end of Section.
 - 2. **Documentation:** Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products to allow for inspection and measurement of quantity or counting of units.
 6. Store materials in a manner that will not endanger Project structure.
 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 9. Protect stored products from damage.
- B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.07 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and

limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 - 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.01 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 - 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 - 7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures: Substitutions may be considered, unless otherwise indicated. Procedures for product selection include the following:
 - 1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
 - 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
 - 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

4. **Manufacturers:** Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. **Available Products:** Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. **Available Manufacturers:** Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. **Product Options:** Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
8. **Basis-of-Design Products:** Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product(s)" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
9. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
10. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - b. **Full Range:** Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.02 PRODUCT SUBSTITUTIONS

- A. **Timing:** Architect will consider requests for substitution if received within 60 days after execution of Contract. Requests received after that time may be considered or rejected at discretion of Architect.

- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.
 10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.03 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

(See following pages for Substitution Request form)



Architect: Distribute Completed Copies to Following:

<p>Substitution Request</p> <p>Resigned certifies:</p> <ul style="list-style-type: none"> • Proposed substitution has been fully investigated to be equal or superior in all respects to specified product. • Same warranty will be furnished for proposed substitution as for specified product. • Same maintenance service and source of replacement parts, as applicable, is available. • Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule. • Cost data as stated above does not include items for additional costs related to accepted substitution which may subsequently become apparent are to be waived. • Proposed substitution does not affect dimensions and functional clearances. • Payment will be made for building design, including A/E design, detailing, and construction costs caused by the substitution. • Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects. <p>Attention: _____ Submittal No.: _____</p> <p>Signed For: Metrobase Project</p>	<p>Owner: _____ Consultant(s): _____ Title: _____ SR No.: _____ Date: _____ From: _____</p> <p>Architect: RNL Interplan, Inc. 800 Wilshire Boulevard Suite 400 Los Angeles, California 90017</p> <p>Architect's Project No.: 6040-1569-01</p>
<p>Firm: _____ Specification Title: _____ Address: _____ Section, Article, Paragraph and Subparagraphs: _____ Proposed Substitution: _____ Manufacturer: _____ Address: _____ Phone: _____ Trade Name: _____ Model No.: _____ Attachments: _____ Installer: _____ Address: _____ Phone: _____ History: <input type="checkbox"/> New Product <input type="checkbox"/> 2 - 5 years old <input type="checkbox"/> 5 - 10 years old <input type="checkbox"/> More than 10 years old Differences between proposed substitution and specified product: _____ _____ _____</p>	
<p>A/E'S REVIEW AND ACTION</p> <p><input type="checkbox"/> Point-by-point comparative data attached - REQUIRED BY A/E</p> <p><input type="checkbox"/> Substitution approved - Make submittals in accordance with Division 3 Section "Submittal Procedures."</p> <p><input type="checkbox"/> Substitution approved as noted - Make submittals in accordance with Division 3 Section "Submittal Procedures."</p> <p>Reason for not providing specified item: _____</p> <p><input type="checkbox"/> Substitution rejected - Use specified materials.</p> <p><input type="checkbox"/> Substitution Request received too late - Use Specified materials.</p>	
<p>Signed by: _____ Date: _____ Project: _____ Architect: _____</p>	
<p>Additional Comments: <input type="checkbox"/> Contractor <input type="checkbox"/> Subcontractor <input type="checkbox"/> Supplier <input type="checkbox"/> Manufacturer <input type="checkbox"/> A/E <input type="checkbox"/> _____ Date Installed: _____</p> <p>Proposed substitution affects other part of Work: <input type="checkbox"/> No <input type="checkbox"/> Yes; explain: _____ _____ _____</p>	
<p>Saving to Owner for accepting substitution: _____ (\$ _____)</p> <p>Proposed substitution changes Contract Time: <input type="checkbox"/> No <input type="checkbox"/> Yes [Add] [Deduct] _____ days.</p>	
<p>Supporting Data Attached: <input type="checkbox"/> Drawings <input type="checkbox"/> Product Data <input type="checkbox"/> Samples <input type="checkbox"/> Tests <input type="checkbox"/> Reports</p> <p>_____</p> <p>_____</p>	

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1 Section "Submittal Procedures" for submitting surveys.
 - 3. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.03 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.04 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.

- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Existing Utility Information: Furnish information to Construction Manager and Owner that is necessary to adjust, move, or relocate existing utility structures, utility

poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Construction Manager and Owner not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Construction Manager's written permission.
- C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on "Request for Interpretation" form at end of Part 3.

3.03 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for

mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.04 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.05 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.07 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.08 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.09 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01700

(See following pages for Request for Interpretation form)



RNL Interplan, Inc.
 A California Corporation
 800 Wilshire Boulevard • Suite 400 • Los Angeles, California 90017
 213.955.9775 • fax 213.955.9885 • www.rnldesign.com

Denver
 Phoenix
 Orange County
 Los Angeles

**Request
 For
 Interpretation**

Distribute Copies to Following:

- Owner
- Consultant(s):
- Field:

Project: Metrobase Project
 To: RNL Interplan, Inc.
 Architect 800 Wilshire Boulevard
 Suite 400
 Los Angeles, California 90017
 Attention:

RFI No.:
 From:

Owner: Santa Cruz Metropolitan Transit
 District
 370 Encinal Street; Ste. 100
 Santa Cruz, CA 95060

Author:
 Date Issued by Contractor:
 Date Received by Architect:
 Date Returned to Contractor:
 Date Received by Contractor:

Contract For: Metrobase Project

Architect's Project No.: 6040-1569-01

RFI Regarding:
Specification Section Number, Article, Paragraph and Subparagraph(s):
Drawing Sheet Number and Detail Reference(s):
The issue for which Contractor is seeking clarification or interpretation is as follows:
Why is a response needed?
Contractor's interpretation or understanding of the Contract's requirements and reason(s) why they have reached such an understanding are as follows:
Contractor Representative Signature:
Architect/Engineer Response:
Architect/Engineer Signature:
Attachments:

SECTION 01731

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes procedural requirements for cutting and patching, either existing construction or construction indicated on the Construction Documents.
- B. Related Sections include the following:
 - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.
 - 3. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.03 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.04 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch non-operational elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion,

reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.

- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 01731

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

- B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 1 Section "Construction Progress Documentation" for submitting Final Completion construction photographs and electronic storage media.
3. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
4. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.03 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and electronic storage media, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.04 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit 7 copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Page number.

1.06 PROJECT RECORD DOCUMENTS

- A. General:
 - 1. Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's and Construction Manager's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
 - 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 - 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 - 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 - 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets;

bind each set with durable paper cover sheets. Include identification on cover sheets.

- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

- D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.

- E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.07 OPERATION AND MAINTENANCE MANUALS

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
 - 1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.

 - 2. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.

- e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.08 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.
 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 3. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.
 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
1. System design and operational philosophy.
 2. Review of documentation.
 3. Operations.
 4. Adjustments.
 5. Troubleshooting.
 6. Maintenance.
 7. Repair.

3.02 FINAL CLEANING

- A. General:
1. Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

SECTION 02120

EXISTING PLANTS TO REMAIN

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. Work Included: Provide protection of all existing plants and planted areas indicated to remain as shown on Drawings.
- B. Related Work:
 - 1. Finish Grading - Section 02210.
 - 2. Irrigation - Section 02810.
 - 3. Soil Preparation - Section 02920.
 - 4. Planting - Section 02950.
 - 5. Landscape Maintenance - Section 02970.

1.03 PROJECT CONDITIONS

- A. Review: Visit and walk the site with the Owner's representative to clarify scope of work and understand project conditions.
- B. Documentation: Confirm location of all plant materials designated on Drawings as "Existing to Remain". Examine existing irrigation system to remain, and report all malfunctioning equipment, to be repaired by Owner. Record all discrepancies and all conditions which threaten existing plantings.
- C. Acceptance: Commencing work shall be taken as acceptance by the Contractor of responsibility for the protection of all existing site plantings, with the exception of discrepancies and corrections noted above.

1.04 SUBMITTALS

- A. Shop Drawings: Construction details for protective barriers and barricades as required.
- B. Schedule: Watering schedule, where interruption of irrigation systems will exceed one watering period.

1.05 DEFINITIONS

- A. Protection: Provide all barricades as required to prevent all damage to existing plant materials to remain, including but not limited to protection from mechanical damage, and soil compaction, pollution from all sources, and disruption of environmental support which would result in the loss of vigor of said plantings.

- B. Drip Line: An imaginary line on the ground around a tree representing its outermost branch tips. All of the area within the drip line of existing trees to remain is to be protected from damage as specified herein, unless otherwise noted, and shall be referred to as the Tree Protection Zone (TPZ).

1.06 SCHEDULING

- A. As required, construct protective barriers prior to demolition and selective clearing. See Section 01500. Construct other barriers as scope of work progresses.

1.07 WARRANTY

- A. General: During the Warranty Period for new plantings, similarity warrant all existing plant materials against decline resulting from damage during construction. See Section 02950 - Planting.
- B. Exclusions: Damage due to vandalism, Acts of Nature, or neglect by Owner.

1.08 REPLACEMENTS

- A. General: Existing planting to remain which exhibits conditions which are determined as unacceptable due to inadequate protection during construction shall be replaced by Contractor at no expense to Owner.
- B. Quality: Closely match replacements to adjacent specimens of the same species.
- C. Planting, Maintenance, and Warranty of Replanted Materials: See Section 02950 - Planting.

1.09 FINAL ACCEPTANCE

- A. See Section 02970 - Landscape Maintenance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Fertilizers, Herbicides, and Pest Control - See Section 02950 - Planting, and Section 02970 - Landscape Maintenance.

2.02 BARRIERS AND BARRICADES

- A. As described in 3.01, A.

2.03 SAFETY

- A. Provide all reflective signage and/or flashers as required by all codes and ordinances affecting barricaded plantings to remain.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide 6-foot high chain-link fencing barriers at the Tree Protection Zone (TPZ) of all trees designated to remain. Grouping of trees may be enclosed by a single protective fence.

3.02 OPERATIONS

- A. Storage: Do not store materials or equipment under the branches of all existing trees nor in lawn or ground cover areas to remain.
- B. Traffic: Do not operate nor park equipment within the drip line of existing trees to remain. Limit foot traffic within dripline of existing trees.

3.03 EXCAVATING AND GRADING

- A. Cut: Do not permit machine excavation within the drip line of existing trees to remain. All such work shall be hand labor. Do not permit more than two (2) inches of existing soil to be removed within the drip line except as authorized in writing by Landscape Architect.
- B. Fill: Do not permit stockpiling of soil within the drip line of all existing trees nor on existing lawn or groundcover areas. Do not permit more than three (3) inches of fill to be placed within the drip line during grading operations without written acceptance of Landscape Architect.

3.04 MAINTENANCE OF EXISTING PLANTING

- A. General: During the Maintenance Period for new planting, similarly maintain all existing plantings to remain. See Section 02970 - Landscape Maintenance.
- B. Fertilizers: Do not use complete fertilizers on existing plant materials unless soils test indicates specific nutrient deficiencies.

3.05 CLEAN UP

- A. At close of construction in each area, remove all protective barriers at the direction of the Landscape Architect. Transport all barrier materials off site at no additional expense to Owner.
- B. Repair all grades and restore all damaged plant materials.

END OF SECTION 02120

SECTION 02210
FINISH GRADING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included: Execute finish grades complete, as shown, and as specified.
- B. Related Work:
 - 1. Existing Planting to Remain - Section 02120.
 - 2. Irrigation- Section 02810.
 - 3. Soil Preparation- Section 02920.
 - 4. Planting - Section 02950.
 - 5. Landscape Maintenance - Section 02970.
- C. Unit Pricing: Per square foot.

1.03 PROJECT/SITE CONDITIONS

- A. Existing Conditions: For protection of existing plants to remain, see Existing Planting to Remain - Section 02120.
- B. Dust Nuisance: Assume full responsibility for alleviation or prevention of dust as a result of grading work.

1.04 SEQUENCING AND SCHEDULING

- A. Complete all finish grading prior to installation of sprinkler irrigation systems in each area graded.
- B. Re-grade as required to finish grades established by Landscape Architect once the sprinkler system is installed.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. At Contractor's option.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that the following items have been completed prior to commencement of finish grading:
 - 1. Installation of topsoil and soil preparation including debris removal.
 - 2. Incorporation of soil amendments.

3.02 INSTALLATION

- A. Finish Grading:
 - 1. Provide all grades for natural runoff of water without low spots or pockets. Accurately set flow line grades at 2 percent minimum gradient unless otherwise noted in Drawings.
 - 2. Finish grades shall be smooth, even and on a uniform plane with no abrupt changes of surface. Slope uniformly between given spot elevations.
 - 3. Grades not otherwise indicated shall be uniform levels or slopes between points where elevations are given, or between points established by walks, paving, curbs or catch basins.
 - 4. Tops and toes of all slopes shall be rounded to produce a gradual and natural-appearing transition between relatively level areas and slopes.
- B. Tolerances:
 - 1. All planting areas shall be true to grade within 1 in. when tested with a 10 ft. straightedge.
 - 2. Hold finished grades below top of adjacent pavement, headers, curbs, or walls as follows: Shrub, Annual and Groundcover Areas: 1-1/2 inches.

END OF SECTION 02210

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Removal of surface debris.
 - 2. Removal of existing asphalt concrete, pavement and dikes and Portland cement concrete pavement and curbs.
 - 3. Removal of underground utilities.
 - 4. Abandonment of underground utilities.
 - 5. Removal of underground stormwater treatment tanks.
 - 6. Removal of shrubs, trees, tree stumps, and other plant life.
 - 7. Topsoil excavation.
- B. Related Sections include the following:
 - 1. Division 2 Section "Existing Plants to Remain."
 - 2. Division 2 Section "Erosion Control."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in preparing the site including materials, clearing and grubbing, site clearing, loading and removing waste materials from site, and removal or abandonment of underground utilities as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for site preparation and no additional compensation will be allowed therefor.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for environmental requirements and disposal of debris.
- B. Conform to all requirements of Owner's Representative and these specifications.
- C. Coordinate clearing work with utility relocations.

D. Comply with Erosion Control Requirements in Division 2 Section "Erosion Control."

1.06 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.
- B. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide materials, not specifically described but required for proper completion of the work of this Section, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify that existing plant life designated to remain is tagged or identified and is protected per Section 02120, Existing Plants to Remain.
- C. Remove all waste from District Property and dispose of in a legal manner.
- D. Identify a waste area for placing removed materials.
- E. Coordinate with Owner and verify dates and times utilities are to be shut off to accommodate relocation, extension or removal. Verify utilities have been shut off or relocated prior to beginning work on said utility lines, or site clearing.

3.02 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage. Location of existing utilities shown on plans is approximate. Contractor is responsible for locating all existing utilities prior to starting work.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping, per Division 2 Section "Existing Plants to Remain." Provide positive barrier around trees and plant growth to remain.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- D. Erosion control measures shall be in place prior to stripping topsoil.

- E. Do not damage building elements, utilities, items and other improvements indicated to remain. Items of salvage value and not included on schedule of salvage items to be returned to Owner shall become the property of the Contractor. Storage or sale of items at the project site is prohibited.
- F. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- G. Protection of persons and property:
 - 1. Barricade open depressions and holes occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 - 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations under this Section.

3.03 CLEARING

- A. Notify Owner's Representative four working days prior to clearing or grading.
- B. Clear areas required for access to site and execution of Work.
- C. Clear vegetation and shrubs indicated. Remove stumps, main root ball, and root system completely in areas of structural support for building roads, or other improvements.
- D. Strip all surface vegetation and top 3 inches of soil from the area of the site to be cleared.
- E. Clear undergrowth and deadwood, without disturbing subsoil.

3.04 REMOVAL

- A. Remove all debris, rock, trees, tree stumps, and extracted plant life from site. Extent of stripping to be determined in the field by Owner's Representative. Dispose of in a legal manner. See also Section 02315.
- B. Clean out roots 25 mm (1") in diameter and larger to a depth of at least 300 mm (12") below the existing ground surface or subgrade of new graded surface, whichever is lower. Treat roots remaining in the soil with a weed killer approved by the Landscape Architect.
- C. Tree brush wood waste and all other waste and debris shall be delivered to a recycling facility to the maximum extent possible.
- D. Partially remove paving, curbs, and drainage structure as indicated. Neatly saw cut edges at right angle to surface and in a straight line.
- E. Blasting is not permitted.
- F. Remove all pavement and base in future planting areas.

- G. Completely remove underground utilities as shown on the plans. Where shown to be abandoned in place, grout solid as directed.
- H. Existing asphalt concrete pavement, if pulverized into fragments no larger than 2" in any dimension, may be mixed with underlying aggregate base (if any), and the mixture used as structural fill.
- I. Removal of asphalt concrete or Portland cement concrete shall be made to neat sawn cuts extending a minimum of 2" below the surface.

3.05 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials. See Section 02315, Excavation.
- B. After the area has been cleared of vegetation, strip the existing topsoil to the depth necessary to provide at least 150 mm (6") depth of topsoil in areas shown on the Drawings to be turfed or planted, and to fill planters, without contamination with subsoils.
- C. Do not excavate wet topsoil.
- D. Areas for stock piling are limited to project site. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage and protect from erosion.
 - 1. Maintain stockpile free from debris and trash.
 - 2. Keep the topsoil damp to prevent dust and drying out.
- E. Remove excess topsoil not intended for reuse from site and dispose of in a legal manner.

3.06 DISPOSAL

- A. General:
 - 1. Remove brush, grass, roots, trash, and other material from clearing operations.
 - 2. Dispose of away from the site in a legal manner.
 - 3. Do not store or permit debris to accumulate on the job site.
- B. Do not burn debris at the site.

3.07 UTILITIES

- A. Coordinate with utility companies and agencies as required.
- B. Where utility cutting, capping, or plugging is required, perform such work in accordance with requirements of the utility company or governmental agency having jurisdiction.

END OF SECTION 02230

SECTION 02231

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Aggregate base course, as shown on the plans, details and as directed.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Existing Plants to Remain."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Flexible Pavement."
 - 7. Division 2 Section "Rigid Pavement."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. ASTM D1557: Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- C. ASTM D2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- D. Caltrans Standard Specifications, 2002 Edition, Section 26, "Aggregate Bases," excepting the Measurement and Payment sections contained therein.
- E. City of Santa Cruz Standard Specifications, Technical Provisions, Section 12: Construction of Streets.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in placing aggregate base course including materials and placement and compaction of aggregate base course as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the contract prices paid for the various items of work in which aggregate base course is involved and no additional

compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Certificate of compliance with Caltrans specifications if requested by Owner's Representative.
- B. In the case of work within the City of Santa Cruz Right-Of-Way, samples of Aggregate Base material must be submitted to the City Engineer for testing and approval prior to use.

1.06 QUALITY ASSURANCE

- A. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for at least three years.
- B. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Caltrans Class II Aggregate Base: As specified in Section 26 of the Caltrans Standard Specifications, 3/4 inch maximum grading, angular in shape.
- B. Soil Sterilant shall be Polybor chlorate or and approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify substrate has been inspected, gradients and elevations are correct, and that the substrate is dry.

3.02 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, yielding, muddy, or frozen surfaces.
- C. In the case of work within the City of Santa Cruz Right-Of-Way, soil sterilant shall be applied to all areas to be paved prior to application of Prime coat at a rate of approximately 1,800 pounds per acre, or as recommended by the manufacturer. To facilitate application, it may be dissolved in water and washed into the surface by further application of water under the direction of the Engineer.

3.03 AGGREGATE BASE COURSE PLACEMENT

- A. Spread aggregate base course over prepared substrate to a total compacted thickness as shown on the plans.

- B. Place aggregate base course in maximum 8-inch loose lift layers and compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Moisture condition to achieve moisture content as directed by Owner's Representative to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content, as directed by Owner's Representative.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from Design Elevation: Plus or minus 1/2 inch.

3.05 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.

3.06 SCHEDULES

- A. Under asphalt and concrete pavement: Compact placed aggregate materials to achieve compaction of 95 percent of maximum dry density.

END OF SECTION 02231

SECTION 02315

EXCAVATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Excavating for building, slabs-on-grade, paving, landscaping, and site utilities.
 - 2. Excavating for stormwater treatment tanks.
 - 3. Site grading.
 - 4. Scarification of existing subgrade under pavement.
- B. Related Sections include the following:
 - 1. Division 2 Section "Existing Plants to Remain."
 - 2. Division 2 Section "Site Clearing."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Site Water Lines."
 - 7. Division 2 Section "Natural Gas Distribution."
 - 8. Division 2 Section "Subdrainage Systems."
 - 9. Division 2 Section "Stormwater Treatment System."
 - 10. Division 2 Section "Storm Drainage."
 - 11. Division 2 Section "Site Sanitary Sewer Systems."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. Caltrans Standard Specifications, 2002 Edition, Section 19-2, "Roadway Excavation," and Section 19-3, "Structure Excavation and Backfill," excepting the Measurement and Payment sections contained therein.
- C. City of Santa Cruz Standard Specifications, Technical Provisions.

1.04 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

1.05 SUBMITTALS

- A. None required.

1.06 QUALITY ASSURANCE

- A. Special Inspections: Per Section 1701.5.13 of the Uniform Building Code.
 - 1. Observation of soil excavation and foundation construction by the Geotechnical Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Excavated on-site material is suitable for re-use as compacted fill provided it is free of organic material and other debris and rocks greater than 4-inches in maximum dimension. Imported fill shall be free of organic material, shall contain no material larger than 4-inches and shall have a Plasticity Index of less than 116.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect existing utilities that are to remain from damage. Locations of existing utilities shown on plans are approximate. Contractor is responsible for locating and protecting all utilities prior to starting work.
- C. Contractor is responsible for utility removal and relocation. Provide notification to Owner's Representative per Division I requirements.
- D. Protect plant life and other features remaining as a portion of final landscaping, per Section 02120: Existing Plants to Remain.
- E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. All loose material, existing fill, vegetation, debris, remnants of any demolished building foundations and other deleterious material should be stripped and removed from the areas to be developed/improved. This material shall be legally disposed of in a suitable location off-site.

3.02 EXCAVATING

- A. Shore and/or underpin adjacent structures which may be damaged by excavating work in accordance with Geotechnical Report.
- B. Comply with requirements of Geotechnical Report and Owner's Representative in field.
- C. Notify Owner's Representative of unexpected subsurface conditions, if encountered, per Division One.

- D. Excavation shall proceed as necessary for planned grades, and soft and/or yielding materials found in the location of the planned structures should be over-excavated and replaced with engineered fill. Areas to be filled should be scarified to at least an 8-inch depth, moisture conditioned to at least optimum moisture content and compacted to at least 90 percent relative compaction based on ASTM D-1557-00.
- E. Once the area has been prepared, including removing the existing fill material, the new fill shall be placed in horizontal lifts not exceeding 8-inches in loose lift thickness, moisture conditioned to at least optimum moisture content, and compacted in lifts to at least 95 percent relative compaction beneath all structures, and 18-inches below the aggregate base rock for pavements, and 90 percent relative compaction elsewhere, based on ASTM D-1557-00.
- F. Allowable slope gradients are related to moisture content and seepage forces in onsite soils. Drainage facilities such as subdrains, gravel blankets, rockfill surface trenches or horizontally drilled drains may be required by the Owner's Representative during grading.
- G. Strip site of organically contaminated topsoil. The required depth of stripping depends on the time of year and must be based on observations by the Owner's Representative. The anticipated depth of stripping is a minimum of 3 inches. Soil to be reused as landscape material must be stored at an appropriate location on site.
- H. Areas to receive fill shall be scarified to at least an 8-inch depth, moisture conditioned to at least optimum content and compacted to at least 90 percent relative compaction based on ASTM D 1557-00.
- I. Following the stripping, the area should be excavated to the bottom of all proposed slabs-on-grade and pavements, plus depth of subbase and/or capillary break as required on the plans and details. In landscape areas the site should be excavated to the design grade plus depth required for topsoil and soil amendments as required in Section 02920.
- J. In slab-on-grade and pavement areas, prepare subgrade as described in the Geotechnical Report to a depth as described on the plans and details. No subgrade preparation is required in bedrock.
- K. In areas to receive engineered fill, excavate the top 12 inches of native soil (after stripping topsoil) and replace with engineered fill as described in Section 02320.
- L. Permanent cut slopes shall not exceed a 2: 1 (horizontal to vertical) slope or a 4 foot vertical height without consulting the Owner's Representative.
- M. Grade top perimeter of excavation to prevent surface water from draining into excavation. Keep excavations free from water.
- N. Hand trim bottom and sides of excavation to provide square and plumb excavations. Remove loose matter, lumped subsoil, boulders, and rocks over 2½" in diameter.
- O. Remove and/or compact soft, disturbed or un-even areas.
- P. Correct over-excavated areas in accordance with Section 02320.

- Q. Scarify and recompact subgrade subbase under pavement as required in Geotechnical Report and as shown in plans.
- R. Areas for stock piling are limited to project site.
- S. Water all exposed soil subject to machinery or vehicle traffic. Water at least once a day when soil is dry enough and wind is present to cause appreciable amounts of dust.
- T. Excavate subsoil to accommodate building foundations, slabs-on-grade paving, site structures, and construction operations.
- U. Do not excavate within a 2:1 slope from the bottom outside edge of all footings.
- V. Stockpile excavated material acceptable as engineered fill per Geotechnical Report in area designated by district. Remove excess or unsuitable material from site and dispose of in a legal manner.
- W. Provide shoring and bracing as needed for compliance with OSHA regulations.

3.03 FIELD QUALITY CONTROL

- A. The Owner's Representative will observe all excavations prior to placement of backfill material, including all foundation bearing surfaces.

3.04 PROTECTION

- A. Protect trees per Section 02120.
- B. Provide for slope stability and excavation per "Document 00320 - GEOTECHNICAL INVESTIGATION INFORMATION."
- C. Provide Erosion Control and Sediment per Section 02374.

END OF SECTION 02315

SECTION 02320

BACKFILL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Building perimeter and site structure backfilling to subgrade elevations.
 - 2. Site filling and backfilling.
 - 3. Fill under slabs on grade and paving.
 - 4. Fill for over-excavation.
 - 5. Consolidation and compaction as scheduled.
 - 6. Backfill for retaining walls.

- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Existing Plants to Remain."
 - 3. Division 2 Section "Excavation."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Site Water Lines."
 - 7. Division 2 Section "Natural Gas Distribution."
 - 8. Division 2 Section "Subdrainage Systems."
 - 9. Division 2 Section "Stormwater Treatment System."
 - 10. Division 2 Section "Storm Drainage."
 - 11. Division 2 Section "Site Sanitary Sewer Systems."
 - 12. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.

- B. ASTM D1557-91: Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

- C. ASTM D2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

- D. Caltrans Standard Specifications, 2002 Edition, Section 19-3, "Structure Excavation and Backfill," and Section 19-5, "Compaction," excepting the Measurement and Payment sections contained therein.

E. City of Santa Cruz Standard Specifications, Technical Provisions.

1.04 SUBMITTALS

A. Imported fill samples must be submitted to the Owner's Representative for testing and approval not less than four days before delivery to site.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

- A. Excavated on-site Schist may be used for backfill, as long as it is approved by the Owner's Representative.
- B. Excavated site soil may be used for backfill, as long as it is not classified by the Geotechnical Engineer as expansive.
- C. Capillary break under slabs: ¾" clean crushed rock, or per Geotechnical Report.
- D. Aggregate base shall be Caltrans Class 2 Aggregate per Standard Specifications, ¾" maximum grading.
- E. Two-sack cement slurry backfill may be used around buried structures such as piping, manholes, catch basins, wastewater lift station, and stormwater treatment tanks.
- F. Imported fill material shall be:
 - 1. Free from organics.
 - 2. Free of rocks in excess of 4 inches in size.
 - 3. Have a Plasticity Index less than 16.
- G. Asphalt pavement and aggregate base removed from the site may be reused as engineered fill provided that the asphalt concrete is broken down so that no pieces are greater than 2" in size.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify required subdrainage, dampproofing, and waterproofing installations have been inspected prior to backfilling.
- B. Verify structural ability of unsupported walls to support imposed loads by the fill.

3.02 PREPARATION

- A. Prepare all areas to receive fill per Geotechnical Report, and as directed.
- B. In building areas, scarify upper 8 inches of subgrade, moisture condition 1% to 3% over optimum, and recompact to 95% relative compaction or as shown on the plans or in Geotechnical Report.

- C. In paving areas with vehicle access, scarify upper 8 inches of subgrade, moisture condition 1% to 3% over optimum, and recompact to 95% relative compaction or as shown on the plans or in Geotechnical Report.
- D. In areas where compaction is required other than building and paving areas, scarify upper 8 inches of subgrade, moisture condition 1% to 3% over optimum, and recompact to at least 90% maximum dry density or as shown on the plans or in Geotechnical Report.
- E. In landscape areas where compaction is required, scarify upper 8 inches of subgrade, moisture condition 1% to 3% over optimum, and recompact to at least 80% maximum dry density or as shown on the plans or in Geotechnical Report.

3.03 BACKFILLING

- A. Unless State Highway Provisions are to be adhered to through encroachment permits, the following methods shall be used: After the pipe and appurtenances have been properly constructed and inspected and the Engineer has finished locating the fittings and wye branches, soil shall be deposited into the trench with hand-shovels to a depth of two-thirds of the pipe. The soil shall then be hand-rammed under the pipe with bent steel bars and, in the case of work within the City of Santa Cruz Right-Of-Way, with bent steel bars approved by the City Engineer. After the initial backfilling has been inspected and approved by the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, inspected and approved by the City Engineer, the pipe shall be covered to depth of approximately six inches with soil, free from rocks and large lumps, and this layer shall be compacted by using hand tampers.

The remainder of the trench shall be backfilled by one of the following methods:

1. Trenches within City of Santa Cruz Streets and on site paved areas shall be backfilled with sandy gravel. Attain 90% relative compaction to within 2.0 feet of the finish grade surface and 95% relative compaction in the remainder. Relative compaction shall be measured by Test Method No. California 216. It may be necessary to use alternate compaction methods if this degree of compaction is not attained.
 2. Trenches in easements outside of City of Santa Cruz Streets and On Site outside of pavement areas shall be backfilled with soil and compacted to attain 85% relative compaction. Relative compaction shall be measure by Test Method No. California 216. It may be necessary to use alternate compaction methods if this degree of compaction is not attained. The backfill shall be carried up to the natural surface of the ground, carefully leveled and smoothed.
- B. Where pipelines are located perpendicular to slopes steeper than 12° (21% slope), impervious clay (or low slump, 5-sack reinforced concrete) trench plugs (minimum 3-foot horizontal dimension) shall be provided at minimum 30-foot intervals.
 - C. Any storm sewer mains with less than two and one-half (2-1/2) feet of cover or sanitary sewers with less than three (3) feet of cover from the top of the pipe to roadway surfaces shall be completely encased in concrete. Storm drain laterals and sanitary sewer services shall be incased in concrete when the cover is less than two (2) feet.
 - D. Restoration of Pavements and Other Structures: Within the City of Santa Cruz Right-Of-Way all street pavements, sidewalks, curbs, gutters or other structures, cut,

removed or in any way damaged by the contractor in connection with the construction work shall be replaced or restored. It is the intent of these specifications that sidewalks, curbs, gutters or other structure restorations shall be of the same type and dimensions as the original structure or as shown on the plans. The standard restoration of streets within the traveled way shall be 6 inches of aggregate base and 2 inches of asphalt concrete surfacing conforming to the City of Santa Cruz Standard Specifications for Construction of Streets. Prior to placing asphalt concrete, the edges of abutting pavement shall be carefully cleaned and painted with asphaltic emulsion. The finished pavement surface shall be rolled flush with abutting pavement. Where no paving of any kind exists, no repaving will be required unless called for on the plans.

1. When pavement is concrete or concrete covered by asphalt, concrete pavement shall be replaced to the elevation, lines and grades of the existing concrete. All Portland cement concrete shall be Class A, six sack concrete. Expansion joints shall be as directed by the City Engineer. Prior to replacement all existing edges shall be neatly saw-cut to provide a uniform line.
- E. Particular care must be taken in compaction of areas around existing manholes, water valve boxes and covers, and other objects. Where normal roller compaction will not suffice, these areas shall be compacted by mechanical hand compaction equipment satisfactory to the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, satisfactory to the City Engineer.
- F. Finished subgrade shall not vary more than 0.05 feet above or 0.10 feet below the theoretical grade.
- G. Compacting Aggregate Base within the City of Santa Cruz Right-Of-Way:
1. No aggregate base rock shall be placed prior to approval of the subgrade by the City Engineer. Aggregate base rock shall be placed, compacted and tested with the same equipment and methods specified above for subgrade preparation, excepting that untreated base shall not be compacted in layers thicker than 6-inches compacted thickness. The City Engineer must inspect and approve all areas prior to placing surfacing.
 2. Particular care must be taken to assure sufficient moisture content at all times to prevent segregation of large aggregate. Compacted areas showing substantial segregation of aggregate must be re-laid and compacted.
 3. Aggregate base, once inspected and approved, must be protected from segregation by traffic. The Contractor shall, whenever possible, prevent any traffic upon the aggregate base. Areas once approved, but which are torn up by traffic, must be recompacted prior to surfacing.
- H. Backfill voids created by removal of trees, roots, or existing site improvements, with engineered fill.
- I. Backfill areas to contours and elevations shown on plans.
- J. Systematically backfill in lifts not exceeding 8" in un-compacted thickness. Do not backfill over porous, wet, or spongy subgrade surfaces.
- K. Employ a placement method that does not disturb or damage other work.
- L. Maintain moisture content of backfill materials as outlined above or in Geotechnical Report to attain required compaction density.

- M. Do not backfill against retaining walls until 14 days after placing grout or concrete or until wall has reached 50% of its design strength, whichever occurs first.
- N. Compact permeable material and approved soil behind retaining walls to a minimum relative dry density of 90%. Under paved areas compact soil to 95% relative compaction.
- O. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- P. Utility trenches which extend under the perimeter footing shall be backfilled with clayey soils for a distance of 3-feet in both directions out from under the footing.
- Q. Slope grade away from building minimum 2% for unpaved areas. Shape temporary and finished grades so that surface water is not allowed to pond or be trapped adjacent to the building, slabs or pavements.
- R. Make gradual grade changes. Blend slope into level areas.
- S. Maximum fill slope is 2:1 (horizontal to vertical). Key fills into existing slopes as directed by the Geotechnical Report or the Owner's Representative. Fill slopes shall not exceed 15 feet in height without consulting the Owner's Representative for direction.
- T. Key and bench fill slopes into native slopes by providing a 10 ft. wide base sloped negatively 2% into the bank in accordance with the Geotechnical Investigation. Key depth shall be 2 feet deep minimum or as directed by the Owner's Representative.
 - 1. Fill materials placed on slopes steeper than 6:1 shall be continuously keyed and benched at least 1-foot into firm alluvium. The resulting subgrade shall be inspected for firmness prior to placement of any new fill materials.
- U. Remove surplus backfill materials from site.
- V. Leave fill material stockpile areas free of excess fill materials.

3.04 TOLERANCES

- A. Top Surface of Backfilling under Paved Areas: Plus or minus ¼ inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations. Final grading to conform to adjacent existing or new grade.

3.05 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished Work from disturbance.
- B. Reshape and re-compact fills disturbed during construction.

END OF SECTION 02320

SECTION 02324

TRENCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Excavating trenches for utilities from 5 feet outside building to utility mains, or points of connection, as shown on the plans.
 - 2. Compacted fill from top of utility bedding to subgrade elevations.
 - 3. Placement & compaction of aggregate base for pavement.
 - 4. Sand cement slurry backfill for trenches under paved areas.
- B. Related Sections include the following:
 - 1. Division 2 Section "Existing Plants to Remain."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Erosion Control."
 - 5. Division 2 Section "Flexible Pavement."
 - 6. Division 2 Section "Site Water Lines."
 - 7. Division 2 Section "Natural Gas Distribution."
 - 8. Division 2 Section "Subdrainage Systems."
 - 9. Division 2 Section "Stormwater Treatment System."
 - 10. Division 2 Section "Storm Drainage."
 - 11. Division 2 Section "Site Sanitary Sewer Systems."
 - 12. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. City of Santa Cruz Standard Details
- C. City of Santa Cruz Standard Specifications, Technical Provisions, Construction of Sanitary Sewers, Storm Drains and Appurtenances
- D. ASTM C136: Method for Sieve Analysis of Fine and Coarse Aggregates.
- E. ASTM D1557: Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

- F. ASTM D2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in trenching including materials, excavation, backfill, and compaction as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the contract prices paid for the various items of work in which trenching is involved and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. None Required.

1.06 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.07 FIELD MEASUREMENTS

- A. Verify that survey bench mark, control point, and intended elevations for the Work are as shown on drawings.

1.08 COORDINATION

- A. Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

1.09 SHORING

- A. Trenches to be shored as required by the local agency and the State of California, Division of Industrial Safety and Construction Safety Orders.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

- A. Fill Material:
 1. Sand.
 2. Lean concrete cement sand slurry, 2 sack mix.
 3. Native soils.
 4. Import material approved by Owner's Representative.

2.02 TRACER WIRE

- A. Tracer wire: 10 AWG Copper wire. Use over non-metallic pipe.

2.03 TRACER TAPE

- A. Tracer tape: Magnetic, with utility name and appropriate color:

Site Water	Blue
Gas	Yellow
Fire Service Water	Red
Storm Sewer	Green
Irrigation	Blue
Electrical	Orange
Sanitary Sewer	Green
Communications/Data	Orange

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Protect plant life, trees, and other features remaining as a portion of final landscaping. See Division 2 Section "Existing Plants to Remain." Route trenches to avoid trees and groups of trees, and tree roots.
- C. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- D. Maintain and protect above and below grade utilities that are to remain.

3.02 EXCAVATING

- A. Excavate subsoil required for utilities to points of connection.
- B. Except where otherwise specifically authorized in these specifications or where indicated on the drawings, all pipe shall be laid in open trenches. All trenches shall be excavated vertically and shall be of sufficient width to provide free working space on either side of the pipe, and in no case shall such space be less than six (6) inches. Where bracing and shoring is necessary, additional width of trench will be permitted. In any case, there shall be sufficient space between the pipe and side of the trench for through compaction and backfill around the pipe.
- C. The trench shall conform to the lines and grades designated on the drawings. The sub-grade for pipe shall be understood to be the exterior bottom of the pipe. The sub-grade shall be excavated to a level section and to such elevations as will give true flow line elevation when pipe barrels are laid on top of the sub-grade. Bell holes shall be excavated to a sufficient depth to permit the entire barrel of the pipe to be supported on undisturbed material. Whenever the bottom of the trench is excavated below the bottom of the pipe, said fill shall be used to bring the trench up to grade. In cases where the excavated material is satisfactory, in the opinion of the Engineer, and in the case of work within the City of Santa Cruz Right-Of-Way in the opinion of the City Engineer, this material may be used to bring the trench up to grade by compacting with a pneumatic tamper in layers not exceeding four (4) inches thick. When the bedding material encountered is rock, the trench shall be excavated an additional 4

inches below grade and the trench refilled and compacted as specified above.

- D. Where excavation in tunnels is required or permitted, the tunnels shall be driven from shafts located at the places where manhole and other structures are shown on the line of said tunnels and at such other points as may be selected and approved by the Engineer, and in the case of work within the City of Santa Cruz Right-Of-Way, approved by the City Engineer. Where tunnels are made, they shall be cut to a height of at least two (2) feet above grade of the pipe.
- E. When mud or other soft or spongy material is encountered, it shall be removed and the space filled with crushed rock or other material approved by the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, approved by the City Engineer.
- F. The Contractor shall be responsible for the removal of all material from slides or cave-ins and shall be required to restore and repair, at their own expense, all sidewalks, paving pipes or structure of any type which may be damaged or destroyed as a result of the operations.
- G. Material excavated from the trenches shall be kept in compact piles so placed as to cause least possible interference with street or sidewalk traffic. Excess material not required for backfill shall be removed and disposed of immediately and, in the case of work within the City of Santa Cruz Right-Of-Way, it shall be removed and disposed of immediately to a location as approved by the City Engineer.
- H. The Contractor shall provide for and maintain surface drainage; and shall also maintain sewers, storm drains, water and gas pipes, and shall carefully protect all poles, lines, conduits, buildings and other surface and subsurface structures.
- I. The Contractor shall provide adequate roadway crossings over trenches to all driveways or streets cut off by excavation until such time as the excavation is backfilled.
- J. The Contractor shall furnish, install and operate such pumps or other devices as may be necessary for removing water from trenches during construction and until permission is obtained from the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, the City Engineer, to cease pumping.
- K. Sufficient bracing and shoring shall be installed and maintained at all times during construction to insure safety for workers and to protect and facilitate the work. All such bracing and shoring shall be removed during backfilling except in cases where impractical or unsafe.
- L. The maximum length of open trench ahead of pipe installation shall not exceed three hundred (300) feet in normal well sustained earth, and the distance shall be much less in wet or sloughing soils, as advised by the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, as advised by the City Engineer. The length of trench unfilled after pipe is laid shall not exceed five hundred (500) feet.
- M. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work. Overcut finish grade per detail.
- N. Do not excavate within 2:1 slope from the bottom outside edge of spread footings.

- O. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- P. Remove lumped subsoil, boulders, and rock protruding into trench line. See Section 02120 for treatment and protection of the roots.
- Q. Correct over-excavated areas in accordance with Division 2 Section "Excavation."
- R. Stockpile excavated material to be reused in area designated on site and remove excess material not being used, from site.

3.03 BACKFILLING

- A. Backfill trenches to contours and elevations in existing roadways and under paved areas with lean concrete cement sand slurry. Backfill other trenches with sand, import or native materials as shown on the drawings and as specified in Section 02320, compacted as indicated in drawings.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.
- C. Employ a placement method that does not disturb or damage foundation perimeter drainage, and utilities in trench.
- D. Backfill trenches on slopes in a manner that does not allow erosion to occur in trench backfill.
- E. Remove surplus fill materials from site. Surplus materials removed from the site shall become the property of the Contractor
- F. Leave fill material stockpile areas completely free of excess fill materials.
- G. Jetting of materials placed in trenches will not be allowed.
- H. Repair pavement.

3.04 TOLERANCES

- A. Top Surface of Backfilling under Paved Areas: Plus or minus ¼ inch from required subgrade elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations. Final grading to conform to adjacent existing or new grade.

3.05 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no cost to the Owner.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished Work from disturbance.
- B. Reshape and re-compact fills disturbed by vehicular traffic during construction.

END OF SECTION 02324

SECTION 02374

EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Procedures, requirements and guidelines for Contractor designed, constructed, and maintained erosion and sediment control measures.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Site Clearing."
 - 3. Division 2 Section "Excavation."
 - 4. Division 2 Section "Backfill."

1.03 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in erosion control including materials, implementation of erosion control program and as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the lump sum price paid for erosion control and no additional compensation will be allowed therefor.

1.04 SUBMITTALS

- A. Winter Erosion and Sediment Control Plan: Whenever construction is planned during the period October 15 through April 15, submit a Winter Erosion and Sediment Control Plan at least 45 calendar days in advance of any such construction activity. The Winter Erosion and Sediment Control Plan, consisting of drawings and technical specifications prepared by a registered civil engineer, shall be submitted to the Architect for review prior to scheduled implementation. Upon completion of the Architect's review, a meeting will be conducted by the Architect with the Contractor to discuss and agree upon the implementation of the plan.

1.05 QUALITY ASSURANCE

- A. Comply with all governing codes and regulations including applicable federal, state and local agency requirements. Should conflicts occur in the codes and regulations, such conflicts shall be brought to the attention of the Architect for resolution prior to proceeding with the work.
- B. The civil engineer preparing the Winter Erosion and Sediment Control Plans shall be intimately familiar with the unique regulatory requirements this project site will have

due to its location in the coastal zone of California and its proximity to the Monterey Bay National Marine Sanctuary.

- C. Use only experienced workers to install and maintain all erosion and sediment control measures.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 EROSION AND SEDIMENT CONTROL IMPLEMENTATION

A. General:

1. Be responsible for erosion and sediment control within the Project site or anywhere that Project construction disturbs the surface vegetation or soil.
 - a. Prevent erosion of graded areas during construction and until permanent planting will provide protection and permanent drainage and erosion control measures are installed.
 - b. Prevent any sediment from leaving the Project site, either water-borne, air-borne, on the tires of vehicles, or by spillage from off-site hauling of soils.
 - c. No turbid runoff will be allowed to leave the Project site.
 - d. Silt deposits shall be removed as necessary to prevent more than 12 inches of accumulation.
2. Include the cost of all erosion and sediment control measures in the price bid.
3. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

B. Work Restrictions:

1. No clearing, brushing, or grading shall begin until temporary desilting facilities are in place at each watercourse leaving the Project site, and any portion of the site which slopes toward the perimeter has adequate perimeter control facilities in place.
2. Architect shall have completed review and acceptance of Winter Erosion and Sediment Control Plan and all the work shown therein shall be implemented by October 15 or by the date scheduled for commencing construction after October 15, with all required features in place
3. Agreement to the plan by the Architect or other parties does not relieve the Contractor from full responsibility for its effectiveness.

C. Winter Erosion and Sediment Control Plan Requirements

1. Temporary soil stabilization measures shall be installed on all graded slopes steeper than a ratio of five (horizontal) to one (vertical), and/or greater than 10 feet in vertical height measured from toe of slope to top of slope.
2. Desilting facilities shall be provided for all drainage outlets from the graded site and shall be designed for a 25-year storm intensity during the period from October 15 through April 15. They must be detailed on the Winter Erosion and

Sediment Control plan. Submit design and specific recommendations for the following:

- a. Desilting basin volume based on gradient and nature of soils.
 - b. The actual extent of all graded areas and identification of any temporary soil stabilization measures.
 - c. Size of desilting basin outlet pipe and overflow.
 - d. Dike requirements. Minimum wall width, slope of walls, percent compaction, etc.
3. Show the placement of devices to reduce erosion damage within the Project site.
4. Outlet conditions from the desilting basin shall not exceed downstream limitations, with the exception of overflow which is to be designed to provide capacity of 1.5 times the maximum design flow.
5. Provide for:
- a. Adjustment of the plan as grading progresses.
 - b. Control of the grading work so as not to violate assumptions of the plan.
6. Include the following informational notes on the plans:

a. In case of emergency call:

(Responsible person)

At _____
(24 Hour Phone No.)

b. The undersigned civil engineer will review construction of all erosion control work.

(Signature)

(Date)

(Printed name)

(California Registration No.)

- c. A standby crew for emergency work shall be available at all times during the rainy season, October 15 through April 15. Necessary materials shall be available on the Project site and stockpiled at convenient locations to facilitate rapid construction of temporary devices or to repair any damaged erosion control measures when rain is imminent.
- d. Do not move or modify devices without the approval of the Architect.
- e. All removable protective devices shown shall be in place at the end of each working day when the five-day rain probability forecast exceeds 40 percent.
- f. After a rainstorm, remove all silt and debris from check berms and desilting basins.
- g. Immediately repair any graded slope surface protection measures damaged during a rainstorm.
- h. Fill slopes at the Project perimeter must drain away from the top of the slope at the conclusion of each working day.
- i. Between October 15 and April 15, all disturbed slopes not actively used for

- construction shall receive temporary erosion control treatment.
- j. Whenever the depth of water in any device exceeds two feet, barricade and/or guard the Project site to protect the safety of the public until water has subsided.
 - k. Do not pump or otherwise drain unfiltered water from the basins until sediment has settled to bottom of basin.
 - l. Do not fill sand bags with gravel; use only sand or granular soil.
 - m. Do not use perforated risers as pond outlets.
 - n. Do not use filtering devices as a means of control.
 - o. Completely cover any pipe outlet from a desilting basin with sandbags filled with coarse sand as a final means of protection.

D. Use of Permanent Drainage Facilities:

1. Any drainage structures or detention devices which appear in the contract documents may be utilized in the Erosion and Sediment Control Plans on the condition that they are temporarily modified to serve the Contractor's purposes, and cleaned before Project completion.
2. Such facilities have been designed for the District's use in drainage control upon completion of the Project, and shall not be considered as adequate for control during construction except by the independent determination of the Contractor or Contractor's civil engineer.

E. Planted Areas:

1. For the purpose of this Section, planted areas indicated on the drawings are not considered to be installed until one year has elapsed since the time of planting, or until released by the District's Representative as being substantially established. Therefore:
 - a. Maintain planting and erosion control measures around the planted area for at least one (1) year.
 - b. Make repairs to any damaged areas during that time.
 - c. Where planting is lost due to erosion, replace it and begin the one-year period for that portion at the time of replacement.

END OF SECTION 02374

SECTION 02512

SITE WATER DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Pipe and fittings for site fire service water line and domestic cold water line.
 - 2. Valves, fire hydrants, post indicator valves, gate valves, service lines and valves, domestic and irrigation meters, backflow preventers, FDCs, and other appurtenances.
 - 3. Meter boxes, valve boxes, and steel and concrete anchorages.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Existing Plants To Remain."
 - 3. Division 2 Section "Excavation."
 - 4. Division 2 Section "Backfill."
 - 5. Division 2 Section "Trenching."
 - 6. Division 2 Section "Erosion Control."
 - 7. Division 3 Section "Cast-in-Place Concrete."
 - 8. Division 15 Section "Piping Valves."
 - 9. Division 15 Section "Plumbing."
 - 10. Division 15 Section "Fire Protection."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California," authored by Cotton, Shires & Associates, Inc. and dated April 2004
- B. ASTM D1557: Test Methods for Moisture Density relations of Soils and Soil Aggregate mixtures using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop
- C. AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- D. AWWA C105: Polyethylene Encasement for Ductile-Iron Pipe Systems
- E. AWWA C110: Ductile-Iron and Gray-Iron Fittings, 3-inch – 48-inch, for Water
- F. AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- G. AWWA C115: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

- H. AWWA C150: Thickness Design of Ductile-Iron Pipe
- I. AWWA C151: Ductile Iron Pipe, Centrifugally Cast, for Water
- J. AWWA C153: Ductile-Iron Compact Fittings for Water Service
- K. AWWA C500: Gate Valves, 3 through 48 inches NPS, for Water and Sewage Systems
- L. AWWA C503: Wet-Barrel Fire Hydrants
- M. AWWA C509: Resilient-Seated Gate Valves for Water Supply Service
- N. AWWA C511: Reduced-Pressure Principle Backflow Prevention Assembly
- O. AWWA C600: Installation of ductile, Iron Water Mains and Their Appurtenances
- P. AWWA C651: Disinfecting Water Mains
- Q. AWWA C800: Underground Service Line Valves and Fittings
- R. NFPA 24: Private Fire Service Mains and Appurtenances
- S. City of Santa Cruz Water Department: Standard Specifications and Details for the Installation of Water Mains

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in site fire service water line and domestic cold water line installation including materials, trenching, excavation, backfill, compaction, installation of fittings, installation of water pipes, connection to City of Santa Cruz water system, and testing as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for the individual water pipe sizes installed on the project and no additional compensation will be allowed therefor.
- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in water meters including materials, trenching, excavation, backfill, compaction, installation of water meters, and testing as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for water meter and no additional compensation will be allowed therefor.
- C. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in water valve boxes including materials, trenching, excavation, backfill, compaction, installation of water valve boxes, and testing as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for water valve and no additional compensation will be allowed therefor.
- D. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in fire hydrants, post indicator valves, pressure reducing valves, backflow preventers, and FDCs including materials, trenching,

excavation, backfill, compaction, installation of the individual appurtenances, and testing as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for the various appurtenances and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, accessories and appurtenances. Provide certifications and evidence of compliance with specified AWWA and NFPA sections.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Record actual locations of piping mains, valves, fittings, connections, thrust restraints, utility crossings and invert elevations. Provide “as-built” drawings of site water lines.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with these special provisions, plans, and Caltrans Standard Specifications, 2002 Edition.
- B. The Contractor shall furnish all materials needed to complete all work indicated on the drawings and specifications. The materials shall be of the type, size and class indicated on the drawings and shall conform in all respects to the City of Santa Cruz Water Department Standard Material Specifications.
- C. Valves: Manufacturer's name and pressure rating marked on valve body.
- D. The Contractor shall furnish, without any additional cost, such quantities of construction materials as may be required by the Engineer for test purposes. The Contractor shall place at the Engineer’s disposal all available facilities for sampling and testing and cooperate with him in the sampling and testing of all materials.
- E. All work shall conform to City of Santa Cruz Water Department Standards and “Standard Specifications and Details for the Installation of Water Mains”.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 WATER PIPE

- A. Ductile Iron Pipe: All ductile iron pipe shall be in conformance with AWWA C151: Ductile-Iron Pipe, Centrifugally Cast, for Water, cement lined and bituminous coated. Thickness design of ductile iron pipe shall conform to AWWA C115: Thickness Design of Ductile-Iron Pipe. All Ductile Iron Pipe shall be mechanical joint, restrained with retainer glands.

- B. Lining: Lining shall be cement in accordance with AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- C. Encasement: All pipe, fittings, valves and appurtenances shall be encased in polyethylene in conformance with AWWA C105: Polyethylene Encasement of Ductile-Iron Pipe Systems.
- D. Fittings: Fittings shall be mechanical joint in conformance with AWWA C110: Ductile-Iron and Gray-Iron Fittings, 3-inch – 48-inch, for water.
- E. Joints: All joints shall be mechanical joints with retainer glands in conformance with AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- F. Retainer Glands: All Ductile Iron Pipe, Fittings, Valves and Appurtenances shall be constructed with mechanical joints with retainer glands. The restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of AWWA C110. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated with a range of 370 to 470 BHN. The gland shall have a design to fit standard mechanical joints with standard T-head bolts conforming the AWWA C111 and AWWA C153. The restraint shall be UL listed and FM approved and have a minimum working pressure of 350 pounds per square inch. The restraint shall be Megalug Series 1100 as manufactured by EBAA Iron, Inc. or approved equal.
- G. Service Pipe
 - 1. 2-inch and smaller service pipe shall be Type K seamless copper tubing in accordance with AWWA C800: Underground Service Line Valves and Fittings. Copper pipe shall be connected to fittings by use of brass compression type fittings. No solder or flare fittings are allowed. Fittings shall be rated for working pressure equal to the copper pipe or test pressures, whichever is greater.
 - 2. Service pipe greater than 2-inches in diameter shall be ductile iron as described elsewhere in this specification.
 - 3. Service Saddle: Service Saddle shall be Ductile Iron, AWWA FIPT, 250 psi, in accordance with AWWA C800: Underground Service Line Valves and Fittings Mueller DR1S or approved equal.
 - 4. Brass Service Fittings: Corporation cocks, angle meter stops, couplings and connections shall be in accordance with AWWA C800: Underground Service Line Valves and Fittings, Ford, Mueller or approved equal and shall be rated for working pressure equal to the copper pipe or test pressures, whichever is greater. Corporation stop shall be 300 psi, Mueller 300 Ball Type Corporation Valve or approved equal.
 - 5. Service Clamps: Service clamps shall be provided as shown on the City of Santa Cruz Water Department Standard Drawings and manufactured by Ford or approved equal.

2.02 FITTINGS

- A. Fittings shall be ductile-iron, mechanical joint with retainer glands, in conformance with AWWA C110: Ductile Iron and Gray-Iron Fittings, 3-inch – 48-inch, for Water.
- B. Lining and coating: Fittings shall be cement-mortar lined with a bituminous seal-

coated cement-mortar lining and asphaltic coated in conformance with AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water or AWWA C153: Ductile-Iron Compact Fittings for Water Service.

- C. Joints: Joints shall be mechanical joints with retainer glands in conformance with AWWA C110: Standard for ductile-Iron and Gray-Iron Fittings, 3-inch – 48-inch, for Water and AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- D. Restraint: Retainer glands shall be Megalug Series 1100 by EBAA Iron, Inc. or approved equal.

2.03 VALVES AND TAPPING SLEEVES

- A. Gate Valves: Gate Valves shall be iron body, resilient seated, mechanical joint gate valves in accordance with AWWA Standard C509: Resilient-Seated Gate Valves for Water Supply Service. Mechanical joints shall have retainer glands as specified elsewhere. All underground valves shall have non-rising Stems. All gate valves shall OPEN LEFT. Valves larger than 2-inch shall have 5-sided pentagon operating nuts. 2-inch valves shall have 4-sided operating nuts. Fire service valves shall have stainless steel nuts and bolts.
- B. Tapping Sleeves and Valves: Tapping Sleeves shall be cast iron mechanical joint epoxy coated steel or stainless steel full circle tapping sleeves. Tapping sleeves shall accept a standard AWWA tapping valve. Tapping sleeve shall be 250 psi, Mueller H-615 or equal. Tapping valve shall be in accordance with AWWA C509, resilient wedge, M.J. x FL., NRS, 250 psi, Mueller T-2360 or approved equal.

2.04 VALVE BOXES

- A. Valve Boxes shall be a G-5 box as manufactured by Christy Concrete Products, Inc. or equal. Each valve box shall be H-20 load rated and have a cast iron cover marked in accordance with the City of Santa Cruz Water Department Standard Gate Valve Box Lid, Drawing No. 3684-A.
- B. Standard gate valve box lids shall be marked “WATER”, with an arrow and an “O.L.” to indicate the direction in which the valve opens.
- C. Standard fire service valve box lids shall also have “FS” welded on the valve box lid.

2.05 METER BOXES

- A. Meter Boxes and Covers shall be rated for H-20 traffic loading.
- B. Meter Boxes shall be furnished according to the following schedule and shall be manufactured by Christy Concrete Products, Inc. or approved equal:

Size	Christy Model
1”	B16 Box w/ B16C Lid
1-1/2” & 2”	B1730 Box w/ B1730-51GH Lid
3” & 4”	B48 Box w. B48M2 Lid

2.06 FIRE HYDRANTS

- A. Fire Hydrants shall be in conformance with the City of Santa Cruz Water Department Standard Specifications and Details for the Installation of Water Mains.
- B. All fire hydrants shall be designed and manufactured in strict compliance with AWWA C503: Wet-Barrel Fire Hydrants. Hydrant base shall be furnished with a bury section. Inlets shall be mechanical joint restrained with retainer gland. All hydrants shall be painted with a rust inhibitive prime coat followed by a topcoat of traffic yellow enamel paint. All hydrants shall have National Standard hose threads on outlets and shall be installed without hose cap chains.
- C. Hydrants specified as “6-inch Double Hydrant” shall have two 2-1/2” outlets.
- D. Hydrants specified as “6-inch Steamer Hydrant” shall have two 2-1/2” outlets and one 4-1/2” outlet.

2.07 ACCESSORIES

- A. Portland Cement: Portland cement shall conform to the requirements of the latest revision of ASTM C-150, Type II or Type V cement.
- B. Concrete for Thrust Restraints: All concrete shall be Portland cement concrete and shall be composed of Portland cement, fine and coarse aggregates and water, proportioned and mixed as required to produce a smooth, workable mixture. It shall have a minimum ultimate compressive strength of 3,000 pounds per square inch at 28 days, as determined by testing 6” x 12” cylinder samples of the concrete, in accordance with the requirements of ASTM C39-61, Standard Method of Testing for compressive Strength of Molded Concrete Cylinders. The maximum size of aggregate shall be that which passes a 1” mesh screen. Concrete shall not contain less than 6 sacks of cement per cubic yard.
- C. Reinforcement Bars: Reinforcement bars shall conform to the requirements of the latest revision of ASTM Specification A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Intermediate Grade. All bars shall be deformed. Deformations shall conform to the requirement of the latest revision of ASTM Standard A615.
- D. Backfill Material
 - 1. Conform to Santa Cruz Public Works specifications for granular bedding, aggregate base and controlled low strength material (or soil cement bedding).
 - 2. Representative samples of all backfill shall be submitted to the City and the Engineer in advance of construction for testing and approval. No material shall be used in the work until it has been so approved.
- E. Water meter for domestic service shall be rotating disc type in accordance with City of Santa Cruz Water Department Standards. Place meter in underground vault with a traffic-rated lid.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions.
- B. Verify that building service connection and water main size, location, and invert are as indicated. Pothole if necessary.

3.02 PROTECTION OF PROPERTY

- A. The Contractor shall restore all damaged property, including sidewalks, curbing, pipes, conduit, has, water and other services, sewers, monuments, stakes, trees, shrubs and other planting, and other public or private property to a condition as good as it was when he/she entered upon the work.
- B. No material or other obstruction shall be placed within 15-feet of fire hydrants. Convenient access to driveways, houses, buildings, sewer manholes, water main valves and gas main valves along the line of work must be maintained at all times. Temporary approaches to and crossing of intersections shall be provided and kept in good condition.

3.03 CONNECTION TO EXISTING MAINS

- A. The Contractor shall connect the new mains to existing mains at the locations shown on the drawings. The Contractor shall give the City not less than 48 hours notice before these operations are to be made, so that advance notice of the shutdown, if required, may be given to the customers affected. The Contractor shall also stipulate the start time and expected duration of the shutdown, if required.
- B. In general, shutdowns in residential or commercial areas shall be made at times when there will be the least interference with preparation of meals or production. In all cases, shutdowns shall be made in cooperation with and under the direction of the City.
- C. The City will close all valves in making a shutdown, and open all valves in restoring pressure to the existing main and initiating pressure in the new installation. Connection to water lines shall be made by the Contractor only after complete and satisfactory preparation for such work has been made, in order that the shutdown may be as short as possible. In general, all connections to existing mains will be made while flow in the existing main is shut off, as required by the City. All work required to make the connections shall be done by the Contractor.
- D. Where existing mains are provided with fittings for the purpose of connecting to the new main, the Contractor shall remove the plugs or bulkheads, clean the ends, prepare them for connection to the new main and make the new joint. Connections to existing mains must be a minimum of 18-inches from other taps or fittings.

3.04 EXCAVATION

- A. General: The Contractor shall perform all excavation necessary or required for the construction of a pipeline and appurtenances covered by the project drawings and specifications. The excavation shall include the removal and disposal of all materials, of whatever nature encountered, including water and sub-surface obstruction. No

water main shall be installed in the same trench with other utilities unless written approval of the Engineer is first obtained.

- B. Trench Excavation: Excavation of the trench shall follow lines parallel to and equidistant from the location of the pipe centerline. Trenches shall conform to the City of Santa Cruz Public Works Standard Trench Details, latest revision.
- C. Excavation to Grade and Below Grade: Excavation shall be made to depths and widths required to accommodate construction of the pipeline and structures. The grades in general will be such as to provide a minimum depth of cover to finish grade of 36-inches over the top of the pipe, unless shown on the drawings, and unless conditions develop in the field, which require additional depth. A concrete cap must be provided where the depth of cover is less than 36-inches in accordance with City of Santa Cruz Standard Concrete Cap, Drawing No. 2997-A. A minimum of 1-foot vertical clearance shall be maintained between water line and sewer line crossings and the water line shall be constructed above the sewer line. 6-inches of vertical clearance shall be maintained between other utility line crossings.
 - 1. Where, in the opinion of the Engineer, material encountered at the bottom of the trench is found to be unsatisfactory for properly supporting the pipe, the Contractor shall make further excavation to sound material and backfill in accordance with the "Backfill of Trenches" paragraph. Where the water main is installed in fill areas, the bottom of the trench shall have been compacted to a minimum of 95% relative compaction, as determined by Caltrans Compaction Test Procedures, before the pipe is installed. The trench shall be excavated to at least 6-inches below the grade established for the bottom of the pipe in order that a uniform bearing base can be installed in accordance with the "Backfill of Trenches" paragraph. Upon approval of the Engineer, tunneling for short distances under existing facilities, sidewalks and pavement will be allowed.
- D. Bell Holes: Bell holes shall be excavated in the bottom of the trench at pipe joint locations of such size that the process of making joints and inspection can be carried on satisfactorily and so that the pipe barrel will bear evenly on the bearing base.
- E. Bracing and Shoring: Excavations shall be adequately shored and braced so that the earth will not slide or settle, and so that all existing improvements of any kind will be fully protected from damage. Any damage resulting from lack of or inadequate shoring and bracing shall be the responsibility of the Contractor. The Contractor shall effect all necessary repairs or reconstruction at the Contractor's own expense, as directed by the Engineer, and shall bear all other expenses resulting from such damage. All shoring and bracing shall conform to the latest State of California Occupational Safety and Health Standards (CAL/OSHA).
- F. Excavation in Areas Paved with Portland Cement Concrete: Where excavation is located within the sidewalk area and the sidewalk is four feet or less in width, the entire sidewalk shall be removed and replaced. Where excavation is located within a sidewalk area and the sidewalk is more than four feet in width, it shall, in general, be removed and replaced to the nearest existing longitudinal groove or score located outside the limits of the appropriate minimum excavation. In all sidewalk areas, the Contractor shall use a concrete saw to score the sidewalk, and it shall be neatly removed to such score. In any case, whether the alignment of the new excavation parallels or crosses the sidewalk, the Engineer will designate the limits of sidewalk removal and replacement.

1. Where the excavation is located within a street which is paved with concrete, a concrete saw shall be used to score the edges of the pavement 12-inches wider than the trench width (6-inches on each side), and the limits of sidewalk removal and replacement will be designated by the Engineer.
- G. Protection of Other Utilities: If during the progress of the work, the Contractor encounters existing sewers, water mains, gas lines, power cables, fiber optic cables or telephone cables that require laying the new main at a new grade, or require other minor alteration, such relaying or minor alterations will be made at no expense to the owner.
1. The approximate location of all recorded underground utilities is shown on the drawings. Excavation and other work under or adjacent to sewers, water and gas services, conduits and other structures, or appurtenances thereto, shall be prosecuted in such manner as not to interfere with their safe operation or use and proper precaution shall be taken to prevent damage to them. Should any such structure or property be damaged during operations of the Contractor, he/she shall immediately notify the property owners or authorities and arrange for immediate repairs of the same at his/her own expense. The contractor sufficiently in advance of excavation shall determine the exact location of underground utilities or other obstructions so that the pipe alignment can be confirmed or re-routed without delay.
- H. Disposal of Excavated Materials: The materials excavated from the trench shall be so placed as to offer minimum obstruction to vehicular traffic, pedestrians and bicyclists. Gutter and catch basins shall be kept clear, or other provisions shall be made for handling street or road damage. The Contractor at his/her own expense and at his/her own responsibility shall dispose of excess material.
- I. Bridge Over Trench: Foot bridges of approved construction, not less than 4-feet in width and provided with hand-rails and uprights of dressed lumber, shall be installed over the trench at all crosswalks and intersections and at other points where, in the opinion of the Engineer, traffic conditions make it advisable. Bridges shall be tapered at the edges for bicyclist, pedestrian and wheelchair safety. If no smooth surface is available for bicyclists, pedestrians and wheelchairs, the Contractor shall post signs warning "Rough Surface" or "Uneven Pavement" at the beginning of the bridges.
1. Substantially constructed bridges, adequate for handling all vehicular traffic, shall be installed over the trench or other excavation in each street or road intersection, so as to provide a traffic lane extending over not less than one-half (1/2) of the width of the street or road, wherever such excavation obstructs in excess of one-half (1/2) of the width of the street or road crossing. Adequate bridges shall be provided to make possible the safe use of all garage driveways and other driveways or roadways used to move vehicles from the public street onto private property.

3.05 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with restrained mechanical joints, flanges or unions.

3.06 BEDDING

- A. Excavate pipe trench in accordance with Division 2 Section "Trenching," for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction. Place concrete to permit full access to pipe and pipe accessories in accordance with City of Santa Cruz Standard Drawing No. 2996-A.
- C. Place bedding material at trench bottom, level fill materials in one continuous layer 6 inches thick, compacted to 95 percent in paved areas, 90% in other areas. Backfill per Trench Detail on plans. Backfill Trenches through roadways and under pavement with soil cement slurry
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent.
- E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.07 INSTALLATION - PIPE

- A. Fire service piping and appurtenances shall conform to NFPA 24. Provide 48-hour notice for pipe trench inspection prior to installation of thrust restraints by Fire Marshall and Owner's Representative. Trench shall be favorably reviewed and inspected prior to installation of thrust restraints. Provide notice for inspection of installed thrust restraints prior to covering up work.
- B. Handling of Pipe and Accessories: Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe prosecution of the work. All pipe, fittings, and valves shall be carefully lowered into the trench, piece by piece, by means of a crane, ropes or other suitable equipment, in such a manner as to prevent damage to water main material, protective coating, and linings. Under no circumstances shall water main materials be dropped into the trench.
- C. Maintain separation of water main from sewer piping as follows: vertical clearance, two feet, water line above sewer; horizontal clearance, ten feet. Clearance shall be measured from the nearest outside edges of the pipe.
- D. Cleaning Pipe and Fittings: All lumps, blisters and excess coal tar coating shall be removed from the bell-and-spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and be free from oil and grease before the pipe is laid.
- E. Cutting Pipe: The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement-mortar lining and so as to leave a smooth end at right angles to the axis of the pipe. The flame cutting of pipe by means of an oxyacetylene torch will not be allowed.
- F. Pipe Joints: Joints for ductile iron pipe, valves and fittings shall be mechanical joint with retainer glands. The mechanical joints for restrained valves, bends, crosses, tees and dead-end caps shall be installed with a dual restraint system as required by the

City of Santa Cruz: concrete thrust blocks and mechanical joint retainer glands. The mechanical joint retainer glands shall be as specified and the thrust blocks shall be in accordance with the City of Santa Cruz Standard Drawing No. 2996-A.

- G. Laying Pipe: Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting earth or water into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. No debris, tools, clothing or other material shall be placed in the pipe and a visual inspection shall be made of each piece of pipe. Install all pipe, valves and fittings with polyethylene encasement in accordance with AWWA Standard C105, latest revision, Method A. Care shall be taken to prevent soil and foreign material from coming between pipe and wrap.
 - 1. At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a water-tight plug or other means approved by the Engineer. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- H. Bell Ends to Face Direction of Laying: Pipe shall be laid with the bell ends facing in the direction of laying, unless directed otherwise by the Engineer.
- I. Install pipe to indicated elevation to within tolerance of 5/8 inches.
- J. Route pipe in straight line.
- K. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- L. Permissible Deflection at Joints: Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstruction or to plumb stems, or where long-radius curves are permitted, the deflection shall not exceed the manufacturer's recommendation. Bends shall be used whenever individual deflections exceed those specified by the manufacturer.
- M. Unsuitable Conditions for Laying Pipe: No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.
- N. Install access fittings to permit disinfection of water system.
- O. In addition to restrained mechanical joints, form and place concrete for thrust restraints at each valve, fitting, elbow, cross, tee, dead-end or change of direction of pipe main. See City of Santa Cruz Water Department thrust block detail, Drawing No. 2996-A.
- P. Establish elevations of buried piping to ensure not less than 3-feet of cover.
- Q. Backfill trench in accordance with Division 2 Section "Backfill." Do not backfill before inspection by City of Santa Cruz.
- R. Provide air release valves at all high points per City Standards.

3.08 INSTALLATION OF APPURTENANCES

- A. Installation of Valves: The Contractor shall install gate valves at the location shown on

the drawing or where directed by the Engineer. The valves shall be properly fitted to the adjacent sections of the main and supported on concrete piers as shown on the Standard Drawings. Mechanical joints with retainer glands shall be provided in addition to thrust blocks. Flanged joints shall be fitted with gaskets.

- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Installation of Blow-Offs: Where necessary for use in disinfecting the main, the Contractor shall install and remove temporary blow-off at locations shown on the drawings or designated by the Engineer.
 - 1. The diameter of the blow-off shall be 2-1/2 inches or larger on all mains. The blow-off shall include a 3-inch gate valve, 3-inch piping with 90o elbow, 3-inch x 2-1/2 inch reducer to a 2-1/2 inch coupling and plug, pursuant to City of Santa Cruz Water Department Standard Drawing No. 2986-D.
 - 2. Where indicated on the drawings, the Contractor shall install permanent blow-offs. A permanent blow-off is defined as one that will be left in place upon completion of the work. The Contractor shall perform all required excavation, backfill and repair of pavement necessary for the installation and shall install all blow-off material as shown on the Standard Drawings.
- D. Installation of Air and Vacuum Relief Valves: Air and vacuum relief valves shall be installed on the pipeline where shown on the drawings. The valve shall be located outside the roadway at a location to be designated by the Engineer. Pipe and fittings required for connecting the valve to the main shall be as specified on the City of Santa Cruz Standard Combination Air-Vacuum Release/Blow-Off Assembly, Drawing No. 2987-A, as revised, and shall be installed in a workmanlike manner.
- E. Installation of Fire Hydrants: The Contractor shall install new fire hydrants at locations shown on the drawings. He/she shall excavate the trench, place the pipe and hydrant, make joints, backfill the trench and repair the pavement and sidewalk in accordance with the specification of those classes of work and the details shown on City of Santa Cruz Standard Fire Hydrant Installation, Drawing No. 2993-A, as revised.
 - 1. Backfill of trenches containing service line shall be performed as provided in the "Backfill of Trenches" paragraph and be in accordance with the City of Santa Cruz Public Works Standard Trench Details. When indicated on the drawings, existing fire hydrants and connecting piping shall be removed, relocated to the new position along the new main, or disconnected from an existing main and connected to the new main. The Contractor shall perform all required excavation, backfill and repair of pavement necessary for these operations. Fire hydrants shall be placed to allow a minimum of 4-foot wide unobstructed sidewalk. The 4-foot clearance shall extend in all directions around the hydrant.
 - 2. If a hydrant is to be relocated, the hydrant and appurtenances up to the hydrant in the main shall be installed at the location shown on the drawings. If the hydrant is to be reconnected, any unnecessary material shall be salvaged and the new connection made with new material. All salvaged hydrants and appurtenances shall be delivered to the City at the Corporation Yard. All hydrant tees from which piping has been removed shall be plugged and the plug tied back by means of collars and rods. The complete removal of hydrant tees, gate valves, gate valve boxes and piping shall be completed as required by the Engineer.

- F. Installation of Flexible Couplings: Flexible couplings shall be installed at the locations shown on the drawings. Care shall be taken to see that the pipe is in proper alignment and that smooth surfaces have been provided so that the couplings can be properly fitted. After installation, the flexible couplings, except insulating types, shall be electrically bonded to the connecting pipes in accordance with the City of Santa Cruz Standard Drawing No. 3396-A.
- G. Installation of Service Lines: Where indicated on the drawings the Contractor shall install a service line, meter box, tap or connection to the main, and all other appurtenances as shown on the City of Santa Cruz Standard Drawings. Service taps must be a minimum of 18-inches from other taps or fittings.
1. If the existing service line is to be relocated or retired, the Contractor shall obtain the necessary permits as well as schedule inspections and shutdown of the corporation stop. The Contractor shall expose the corporation stop and schedule with the Water Department to turn off/on with 24-hours minimum notice. Relocation of an existing meter box requires that the box be removed and the pipe cut at the corporation stop. In no instance shall the pipe be crimped. Contractor shall restore all pavement.
 2. Backfill of trenches containing service line shall be performed as provided in the "Backfill of Trenches" paragraph and be in accordance with the City of Santa Cruz Public Works Standard Trench Details, latest revision.
- H. Installation or Adjustment of Gate Valves and Gate Valve Boxes: Installation or relocation of gate valves shall conform to the City of Santa Cruz Water Department Standard Drawings No. 2994-A and 3684-A. Gate valves shall be operated by the City of Santa Cruz Water Department crews or under the direction of the Engineer. Contractor shall obtain necessary permits and schedule for inspections and shutdowns with a minimum of 48-hour notice. Adjustment of gate valve boxes shall conform to City of Santa Cruz Water Department Standard Drawings No. 2994-A and 3884-A. The adjustment of the gate valve boxes to final grade may require either of the following methods:
1. If the existing box in undamaged, AC pavement shall be saw cut down to lift depth and a grade ring (with a maximum of two) installed. Pavement shall be replaced by placing AC hot mix to grade.
 2. If the existing box is located above the new grade or is damaged, the box shall be removed and repositioned (if undamaged) or replaced and positioned to the new grade. AC pavement shall be saw cut around the existing box and affected backfill shall be removed and replaced to grade after the box is repositioned, with AC pavement of hot mix replacement.
- I. Concrete: Plain and reinforced concrete anchors for the pipeline, supports of valves and other structures shall be constructed wherever shown on the plans, required or determined by the Engineer. The anchors shall be constructed so as to obtain a full bearing, opposed to axial and lateral thrust, against solid undisturbed material.
1. Ground against which concrete is to be placed shall be moistened previous to placing so that it will not absorb excessive moisture from the green concrete. Forms required shall be smooth, mortar tight and of sufficient strength to maintain shape during the placement of the concrete. Placing methods shall be such that the concrete will be placed in its final position without segregation. All concrete shall be rodded and spaded to ensure smooth surfaces along form lines and to eliminate rock pockets. The use of mechanical vibrators will not be required on anchors and

- valve supports.
2. Concrete shall not be placed in free water. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete material being carried away. No pumping will be permitted during the placing of concrete, or for a period of 24-hours thereafter, unless it is done from a suitable sump separated from the concrete.
 3. Water shall not be allowed to rise on any concrete until the concrete shall have attained its initial set. Every precaution shall be taken against the floating of the pipe, either in existing lines or in the new lines, due to water entering the trench. In case of such floating, the Contractor shall replace the pipe at his/her expense and make good any injury or damage which may have resulted.
 4. The water resulting from cutting or operating existing mains shall be removed and the excavation kept dry until all necessary work within the excavation has been completed.

3.09 CORROSION PROTECTION

- A. Polyethylene Encasement: All buried pipe, fittings, valves and appurtenances shall be encased with polyethylene to form a continuous and all-encompassing layer of polyethylene between the pipe, valves, fittings and appurtenances, and the surround earth of backfill materials. All polyethylene shall be secured in place with 10-mil polyethylene tape. Installation shall conform to the requirements of AWWA C105: Polyethylene Encasement for Ductile-Iron Pipe Systems, Method A.
- B. Coating Mechanical Couplings: All buried mechanical couplings shall be coated. Pipe ends and all coupling components shall be cleaned of dirt and foreign materials prior to placement of the coating. A bitumastic coating shall then be applied in a pouring mold or diaper. The pouring mold or diaper shall be sized to achieve a minimum thickness of ½-inch bitumastic over all coupling components. Only non-metallic molds or diapers shall be used.

3.10 INSTALLATION OF VALVE BOXES, VAULTS AND METER BOXES

- A. Install underground vaults level and to match finished grade.
- B. Valve boxes and extension shall be installed so that no loads are transferred to the valve, valve body or pipe.

3.11 BACKFILLING AND PAVEMENT REPLACEMENT

- A. General: Before backfilling, the trench shall be cleared of all debris such as wood blocks, grade stakes, paper, rope and rags. Caution shall be taken to ensure that the material used for backfilling is free from such debris.
 1. Under any roadbed and in areas adjoining such roadbeds, material used for trench backfill shall have a sand equivalent value of not less than 30, as measured by California Test Method No. 217.
 2. Following completion and acceptance of the backfill, pavement repair, as specified in the "Pavement Repair" paragraph, shall be completed as soon as possible.
- B. Backfill of Trenches: Backfill of trenches excavated within City limits shall conform to the City of Santa Cruz Public Works Standard Trench Details Drawing, latest revision. This includes all pipelines, services and special location trenches that are

excavated in conjunction with the project. Where a trench has been excavated below the design grade of the pipe, that portion of the trench up to; the grade of the pipe shall be backfilled with imported structural backfill material and compacted by means of mechanical tampers in layers not exceeding 6-inches in thickness, or by other approved methods, to provide support for the pipe. The material shall be compacted to a minimum of 95% relative compaction, as determined by California Compaction Test Procedures.

1. After completion of installation of the pipe and appurtenances to the satisfaction of the Engineer, the remainder of the trench shall be backfilled.
2. The backfill material for the portion of the trench from the bottom of the pipe to a maximum level six (6) inches over the top of the pipe shall be backfill material. It shall be brought up evenly on each side of the pipe and thoroughly tamped in place.
3. Unless otherwise ordered by the Engineer, the remaining portion of the backfill extending to the underside of the base course shall be backfilled with imported structural backfill materials. As backfill material is placed around structures or in trenches, it shall be compacted to a minimum of 95% relative compaction, or as required by the Santa Cruz Public Works Department, as determined by the California Compaction Test Procedure. All compaction tests shall be paid for by the Contractor.
4. During the process of backfilling, any timbering, sheeting, shoring or sheet piling used to shore the excavation shall be carefully removed in such a manner as will result in a minimum of caving, lateral movement or flowing of the soil.
5. The final course of backfill material in trenches in unpaved areas shall be of such material and compacted in such a manner that the resulting surface will be as nearly as possible the same as the original surface and shall be armored with such material required by the Engineer to prevent erosion.
6. Backfill material shall not be placed over or around any insulating joint until the joint has been inspected and approved by the Engineer.
7. Unless otherwise approved by the Engineer, the length of the trench for any installation remaining open at the end of each day's work shall not exceed 50-feet, as measured from the point where the excavation has been ended to the point where the backfill has been completed to a degree that the trenches are passable to traffic.

C. Pavement Repair: Following acceptance of the backfill, pavement and/or sidewalk shall be replaced wherever they have been cut or damaged by operations of the Contractor. The material used for the repairs, the method adopted in the placing thereof and the final surface attained shall be subject to the approval of the Engineer. Unless otherwise provided on the drawings, the completed pavement and sidewalk from subgrade to surface shall be identical to that of the original, as near as practicable. Minimum depths of paving, base materials and doweling, when necessary, shall be as indicated on the City of Santa Cruz Public Works Standard Trench Details.

1. In trenches in unpaved parking strips between the curb and sidewalk, no base material will be required. The top 8-inches of backfill in trenches or excavation in such locations shall be replaced with topsoil similar to that removed, or as approved by the Engineer.
2. If required by the Engineer, a temporary one-inch (1") thick asphaltic plant mix surface shall be placed immediately after backfilling has been completed, and removed just prior to placing the permanent surfacing material.

3. Surfacing material shall be placed on the base as soon as possible after backfilling is accepted. Prior to replacing the pavement, the edges of the existing pavement shall be cut to a vertical plane and in straight lines. The edges shall be thoroughly cleaned of all mud, dirt and dust before placing the surface material. Where the surface material is concrete, the side of the existing pavement and the surface of the base material shall be thoroughly wetted just prior to placing the concrete. Where the surface material is bituminous material, the edges of the existing pavement shall be completely coated with a tack coat (RS-1 Asphaltic Emulsion) by spraying. Brushes or daubers shall not be used.
4. Until the permanent pavement is placed, the base rock or temporary asphaltic plant mix at the surface of the trench shall be maintained at all times at a grade level with the adjacent street. Continuous inspection and maintenance of the trench area will be required. Lights and barriers shall be maintained on all work that is not safe for travel until such time as it is made safe.
5. In all roadways, except those paved with Portland Cement Concrete, the surfacing shall be replaced to a depth equal to the existing depth, but not less than 3-inches of Type A asphaltic-concrete as called for in Section 39 of the California Department of Transportation Standard Specifications, latest edition.
6. The completed surfacing shall be thoroughly compacted and shall be free from ruts, bumps, depression or irregularities. A seal coat shall be required to conform to the surface texture of the existing pavement.
7. Concrete paving shall be replaced in kind unless specified otherwise by the Engineer. Concrete used for pavement shall contain not less than 564 pounds (six (6) sacks) of cement per cubic yard, and shall be Class A concrete as specified in Section 90 of the California Department of Transportation Specification, latest edition.

3.12 DISINFECTION OF WATER PIPING SYSTEM

- A. All water piping shall be chlorinated and disinfected per AWWA C651: Disinfecting Water Mains and City of Santa Cruz Standards.
- B. The City will perform the initial disinfection of the public pipeline, using its own forces and the Contractor shall perform disinfection of the private pipeline. City forces, at the Contractor's expense, will perform any additional disinfection that is required. Where determined by the Engineer, the Contractor shall provide taps and shall install corporation stops in the pipelines for the introduction of the chlorine solution and for sampling purposes at no cost to the owner or City.
- C. The minimum time for the laboratory test is 48 hours, and no connections to existing lines of services shall be made until the pipeline has passed the laboratory tests.

3.13 FIELD QUALITY CONTROL

- A. Trench compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest, at no cost to the Owner.
- C. Hydrostatic Tests:
 1. Pressure and Leakage Tests shall be performed in accordance with AWWA C600: Installation of Ductile-Iron Water Mains and Their Appurtenances and the City of

Santa Cruz Water Department Standard Specifications and Details for the Installation of Water Mains.

2. Pressure Test: After the pipe has been laid and backfilled, the pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure of 150 pounds per square inch, or a pressure 50% greater than the operating pressure, whichever is greater.
3. Duration of Pressure Test: The duration of each pressure test shall be at least 1 hour. When the pressure test is performed concurrently with the leakage test, the total duration for both tests shall be 2 hours.
4. Procedure: Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The Contractor shall furnish the pump, pipe connection, and all necessary apparatus except gauges. The City will furnish the gauges for the test and the Contractor shall make all taps into the pipe and furnish all necessary assistance for conducting the test.
5. Expelling Air Before Test: Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-offs are not available at high points, the Contractor shall make the necessary taps at points of highest elevation before the test is made, and insert plugs after the test has been completed.
6. Examination Under Pressure: All exposed pipe, fittings, valves, hydrants and joints will be carefully examined during the test. All services shall be visually checked while the main is under test pressure. Any cracked or defective pipes, fittings, valves, services or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with sound materials and the test shall be repeated until satisfactory to the Engineer.
7. Leakage Test: A leakage test shall be conducted concurrently with the pressure test. The City will furnish the gauge for the leakage test. The Contractor shall furnish the pump, pipe, connections and all other necessary apparatus and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be one (1) hour, and during the test, the main shall be subjected to 150 pounds per square inch pressure, or a pressure of 150% of the operating pressure, whichever is greater. When the pressure test is performed concurrently with the leakage test, the total duration for both tests shall be 2 hours.
 - a. Leakage is defined as the quantity of water to be supplied into the newly-laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. The contractor shall measure the quantity of water added to maintain the specified leakage test pressure.
 - b. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = ND(P)^{1/2}/3700$$

- 1) In which L equals the allowable leakage in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge.
8. Variation from Permissible Leakage: Should any test of pipe laid disclose leakage greater than that specified above, the Contractor shall, at his own expense, locate and repair the defect(s) until the leakage is within the specified allowance.

9. Time for Performing the Test: The pipe shall be tested after the trench has been backfilled, compacted and all concrete reaction blocks have had at least 3 days to cure.

END OF SECTION 02512

SECTION 02539

SANITARY SEWER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Sanitary sewerage drainage piping, fittings, cleanouts, accessories, and bedding five feet outside the building.
 - 2. Connection of building sanitary drainage system to existing sewer.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Manholes and Covers."
 - 7. Division 2 Section "Stormwater Treatment System."
 - 8. Division 2 Section "Storm Drainage."
 - 9. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California," authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. City of Santa Cruz, Department of Public Works, Standard Specifications, Technical Provisions, Section 11: Construction of Sanitary Sewers, Storm Drains and Appurtenances
- C. ASTM D1557: Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- D. ASTM D2321: Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- E. ASTM D3034: Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.
- F. ASTM D2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM A48: Gray Iron Castings.

- H. ASTM C478: Precast Reinforced Concrete Manhole Sections.
- I. ASTM C923: Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- J. City of Santa Cruz Standard Details
- K. City of Santa Cruz Standard Specifications, Technical Provisions, Section 11: Construction of Sanitary Sewers, Storm Drains and Appurtenances

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in sanitary sewer pipe installation including materials, trenching, excavation, backfill, compaction, installation of fittings, installation of sanitary sewer pipes, connection to City of Santa Cruz sewer mains, and connection to sanitary sewer manholes and cleanouts as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for the individual sanitary sewer pipe sizes installed on the project and no additional compensation will be allowed therefor.
- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in sanitary sewer cleanouts including materials, trenching, excavation, backfill, compaction, installation of sanitary sewer cleanouts, and installation of covers as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for sanitary sewer cleanout and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating pipe, pipe accessories, and connections for dissimilar pipes, manhole covers, component construction, features, configuration, and dimensions.
- B. Manufacturer's Instructions: Indicate special procedures required to install Products specified.
- C. Manufacturer's Certificates: Certify that products meet or exceed specified requirements.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Record location of pipe runs, connections, clean-outs, and invert elevations on as-built plans.
- B. Identify, indicate, and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.

1.08 COORDINATION

- A. Coordinate with work performed under other sections.
- B. Coordinate the Work with termination of building plumbing connection outside building.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS

- A. Plastic Pipe: ASTM D3034, Type PSM SDR 26, Polyvinyl Chloride (PVC) bell and spigot-style rubber ring sealed gasket joint. Size as shown on plans.
- B. Vent piping shall be Schedule 40 PVC DWV.

2.02 PIPE ACCESSORIES

- A. Pipe Joints: Double Gasketed seal.
- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, clean-outs, reducers, traps and other configurations required.
- C. Pipe to Manhole Connection: Flexible EPDM Rubber compound boot with stainless steel band and pipe clamp that forms a watertight seal in accordance with ASTM C923, KOR-N-SEAL or approved equal.
- D. Trace Tape: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Sanitary Sewer Service" in large letters.
- E. Tracer Wire: 10 AWG copper wire.

2.03 CLEAN-OUTS

- A. Pipe and Cover: As detailed on plans.
- B. Pad: Cast-in-place concrete of type specified in Division 2 Section "Site Portland Cement Concrete Paving."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

- B. Excavate and backfill pipe trench in accordance with Division 2 Section “Trenching,” for work of this section.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify that built-in items are in proper location and ready for roughing into work.

3.02 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight.
- B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1:500.
- C. Refer to Division 2 Section “Trenching,” for trenching requirements. Do not displace or damage pipe when compacting.
- D. Refer to Division 2 Section “Manhole and Covers,” for manhole requirements.
- E. Connect to building sanitary sewer outlet and extend pipe to point of connection shown on plans.
- F. Install trace wire and colored marker tape continuous above pipeline; coordinate with Division 2 Section “Trenching.”
- G. Core drill existing manhole at new pipe penetration. Manhole to pipe joint to provide a watertight manhole connection with an EPDM Rubber Boot with stainless steel band and clamp.
- H. Coordinate the Work with termination of sanitary sewer connection outside building, connection to site system and trenching.
- I. Sanitary Sewer Laterals: Sanitary sewer laterals shall be installed for all parcels and buildings served by the public sewer.
 - 1. Laterals shall be constructed of vitrified clay pipe conforming to the requirements of the City of Santa Cruz Technical Specifications when the laterals are under street, curbs, gutters, or sidewalks within the City of Santa Cruz Right-Of-Way. Installation thereof shall conform to the City of Santa Cruz Standard Detail “Standard Sanitary Sewer Lateral”.
 - 2. Cleanout wye branches or tees shall be installed at the property line as shown on the City of Santa Cruz Standard Details.
 - 3. All new sanitary sewer laterals shall extend beyond the property line, and shall be marked and located as directed by the City Engineer.
 - 4. The minimum slope for laterals shall be 1/8 inch per foot of lateral.
 - 5. Connection of all sanitary sewer laterals to sewers shall be subject to the approval of the Director of Public Works and none shall be covered until such approval is given.
- J. Marking Sewer Laterals: Where sewer laterals are installed, the location of the lateral shall be marked on the curb immediately above the lateral. An “S” approximately 4-inches high shall be formed into the concrete. The marking shall be done by the

Contractor, and the improvements will not be accepted by the City until the marking is completed. The Contractor shall provide the owner and the owner shall provide the City with a map showing the location of the sewer laterals with distances from lot lines. This map must also be provided before acceptance of the improvements.

3.03 INSTALLATION - STRUCTURES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Scarify and recompact 8" of native material to 95% relative compaction.
- C. Level top surface of recompact native material using 3-inch layer of Class 2 Aggregate Base compacted to 95% relative compaction.
- D. Level top surface of base pad; sleeve concrete shaft sections to receive sanitary sewer pipe sections.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated.
- F. Cut pipe flush with face of manhole.
- G. Catch basins and manholes shall be made water tight at pipe penetration joints using EPDM Rubber boots with stainless steel bands and pipe clamps.
- H. Refer to Division 2 Section "Manholes and Covers," for manhole requirements.

3.04 INSTALLATION - CLEAN-OUTS

- A. Form and place cast-in-place concrete pad with provision for sanitary sewer pipe ends, per detail.
- B. Establish elevations and inverts for inlets and outlets as indicated.
- C. Mount clean-out surface hub level in grout, to match surrounding finish grade and discourage surface water inflow.
- D. Place riser sections plumb and level, trim to correct elevations, grout in-place, anchor to cast-in-place concrete pad.
- E. Flusher Branches: Flusher branches shall conform to the City of Santa Cruz Standard Detail "Standard Flusher Branch". They shall be installed where shown on the drawings. Pipe and jointing shall be the same as that specified for the straight pipe with which they are installed. Riser pipes shall be the same size of the straight pipe with which they are installed.

3.05 FIELD QUALITY CONTROL

- A. Request inspection prior to and immediately after placing bedding. Provide a minimum of 72 hours.
- B. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.

- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- D. Pressure Test: Test new sanitary sewer pipe to 5 psig with air for 15 minutes with maximum ½ psi drop maximum. Clean out system and protect work from damage. Contractor to provide test equipment and perform tests in the presence of, or with the Owner's Representative.
- E. Sanitary Sewer Leakage Test: Sanitary sewers shall be tested by the Contractor for tightness when completed and ready for service by either of the following methods as specified by the Engineer and, in the case or work within the City of Santa Cruz Right-Of-Way, as specified by the City Engineer:
 - 1. Low Pressure Air Test: Before this test is performed, the pipe installation shall be cleaned in the following manner:
 - a. The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line; or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the force of water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event that cemented or wedged debris, or damaged pipe stops the ball, the Contractor shall remove the obstruction.
 - b. Test: The Contractor shall furnish test plugs, an air compressor, other equipment, and personnel for conducting the acceptance test under the direction of the City in the case of work within the City of Santa Cruz Right-Of-Way. Within the City of Santa Cruz Right-Of-way the City shall furnish the test gauge, stopwatch, and the supervision of the test. The test shall be witnessed by the Engineer. Immediately following the pipe-cleaning described, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further with the test.
 - c. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe.
 - d. The pipeline shall be considered acceptable, when tested at an average pressure of 3.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe, if: (1) the total rate of air loss from any section tested in its entirety between manhole and cleanout structures does not exceed 2.0 cubic feet per minute, or (2) the section under test does not lose air at a rate greater than 0.003 cubic feet per minute, per square foot of internal pipe surface.

- e. The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe is not less than that computed by either of the following equations; the equation which gives the shorter time shall govern:

$$T_Q = 0.011 d_1^2 L_1 + 0.011 d_2^2 L_2 + \dots + 0.011 d_n^2 L_n = \text{Total } K,$$

where $K = 0.011 d^2 L$

$tq = \text{Total } K \text{ divided by total } C, \text{ where } C = 0.0003882 dL, \text{ and}$

$$\text{Total } C = 0.0003882 d_1 L_1 + 0.0003882 d_2 L_2 + \dots + 0.0003882 d_n L_n$$

2. Hydraulic Test: A section of pipe shall be prepared for testing by plugging the upper side of the downstream manhole and all openings in the next upstream manhole except the downstream opening. Where grades are steep and excessive test heads would result by testing from one manhole to another, the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, the City Engineer shall specify the method to be used so that the maximum head of any section under test will not exceed 12 feet. Branch sewers running from wye branches on the mains shall be plugged at their upper end if the test head would cause them to overflow.
- a. A section of sewer line prepared for testing, as described above, shall be tested by filling with water to an elevation of four feet above the invert at the midpoint of the test section or four feet above the existing round water elevation, whichever is greater. The water should be introduced into the test section at least four hours in advance of the official test period to allow the pipe and joint material to become saturated with water. At the beginning of the test the elevation of the water in the upper manhole shall be carefully measured from a point on the manhole rim. After a period of one hour or less, with the approval of the Engineer, the water elevation shall be measured from the same point on the manhole rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the upper manhole to restore the water to the level existing at the beginning of the test. Should an initial test show excess leakage in a section of line, it is permissible to draw the water off and test the manhole that contained water. This test shall be made by plugging all the openings in the manhole and filling with water to the same elevation as existed during the testing. The leakage from the manhole may be deducted from the total leakage of the test section in arriving at the test leakage. After the testing is complete, the manhole shall be waterproofed by grouting and/or painting the interior with an approved waterproofing agent.
- b. The allowable leakage in the test section shall not exceed 500 gallons per day per inch diameter per mile of pipe at the above four-foot test head. If it is necessary or desirable to increase the test head above four feet, the allowable leakage will be increased to compensate for the additional leakage due to the increased head.
- c. Sewer section showing leakage in excess of that allowed shall be re-laid or reconstructed as necessary to reduce the leakage as specified above.
- d. All tools, material and appurtenances required for testing the sewers as specified shall be furnished by the Contractor, and no additional compensation shall be provided therefore.

3.06 PROTECTION OF FINISHED WORK

- A. Protect pipe and cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02539

SECTION 02551

NATURAL GAS DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Gas Meter and Regulator.
 - 2. Piping
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 1 Section "Quality Assurance."
 - 3. Division 2 Section "Existing Plants to Remain."
 - 4. Division 2 Section "Excavation."
 - 5. Division 2 Section "Backfill."
 - 6. Division 2 Section "Trenching."
 - 7. Division 2 Section "Erosion Control."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. NFPA 54: Uniform Fire Code with California Amendments.
- C. Uniform Plumbing Code, Chapter 12.
- D. ASTM A53: Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- E. ASTM D2513: Thermoplastic Gas Pressure Pipe, Tubing and Fittings.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in gas piping installation including materials, trenching, excavation, backfill, compaction, installation of fittings, installation of gas pipes, connection to City of Santa Cruz gas mains, and connection to gas meters as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for the individual gas pipe sizes installed on the project and no additional compensation will be allowed therefor.

- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in gas meters and regulators including materials, trenching, excavation, backfill, compaction, and installation of gas meters and gas regulators as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for gas meter and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's data and installation instructions on pipe materials, pipe fittings, valves, meter, regulator, and accessories.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Record actual locations of pipe mains, valves, connections, and invert elevations. Provide "as - built" drawings of site gas lines.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Santa Cruz requirements.
- B. Welding Materials and Procedures: Conform to ASME Boiler and Pressure Vessel Code and applicable state regulations.
- C. Welders Certification Polyethylene Pipe: Pipe fusion welder shall be certified by the manufacturer of pipe.

PART 2 - PRODUCTS

2.01 PIPE

- A. Pipe shall be AGA approved fusion welded polyethylene gas piping by:
 - 1. Phillips Drisco Pipe or
 - 2. NYPAC
- B. Provide non-metallic to metallic transitional fittings at connections to metal piping
- C. Steel Pipe Above Ground: ASTM A53, Schedule 40 black:
 - 1. Fittings: ANSI B16.3, malleable iron, ANSI B16.11, forged steel, or ASTM A234, forged steel welding type.
 - 2. Joints: Threaded. Welded for pipe sizes over 2½ inches.
- D. Polyethylene Pipe: ASTM D2513, SDR 11.5:
 - 1. Fittings: ASTM D2513.
 - 2. Joints: Fusion Welded.
 - 3. Trace wire #10 AWG copper wire attached to top of pipe.
 - 4. Detectable Trace Tape: Magnetic detectable conductor, brightly colored plastic

covering, imprinted with "Natural Gas Service" in large letters.

- E. Valve boxes: triangular with traffic rated lid, Brooks 4TT, Christy G4 or equal valve box lids shall be labeled "Gas".

2.02 VALVES AND GAS COCKS

- A. 150 psig (1040 kPa) WOG, bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends.
- B. Gas Cock and Pressure Regulating Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Plug valve, gas underground sectionalizing valve: valves shall be steel body, lubricating plug type with a minimum working pressure equal to 200 p.s.i. Homestead, Rockwell or equal.
- D. Valves shall have a 2" square operating nut and extensions shall be provided as required to bring nut and grease fitting within 6" of the top of the valve box.

2.03 PRESSURE REGULATING VALVE

- A. Valve: Single stage, malleable iron body, corrosion-resistant, pressure regulator with atmospheric vent, elevation compensator; with threaded ends.
- B. Capacity:
 - 1. For inlet pressure of 10 psi and outlet gas pressure of 7" water column.

2.04 GAS METER

- A. Gas meter shall read in cubic feet of gas per hour and shall be a bellows type manufactured by Singer or American. Meter shall be installed per manufacturer's requirements and project plans & specifications.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that building service connection and utility gas main size, location and invert are as indicated.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Thread ferrous pipe 2 inches (50 mm) diameter and under.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections with threading and unions.

3.03 INSTALLATION - PIPING

- A. Group piping with other site piping work whenever practical.
- B. Route piping in straight line.
- C. Install piping to conserve space and not interfere with use of site space.
- D. Install piping to allow for expansion and contraction without stressing pipe or joints.
- E. Changes in direction of gas piping shall be made by appropriate use of fittings, except polyethylene pipe may be bent to a radius not less than 20 times the normal pipe diameter.
- F. Install cocks and other fittings.
- G. Establish elevations of buried piping to ensure not less than 30 inches of cover.
- H. Lay pipe on bedding.
- I. Wrap couplings and fittings of steel pipe with polyethylene tape and heat shrink over pipe.
- J. Install trace wire continuous over top of pipe buried 6 inches below finish grade, above pipe line; coordinate with Division 2 Section "Trenching."
- K. Backfill trench in accordance with Division 2 Section "Trenching."
- L. Provide AGA approved factory fabricated transition riser between below grade polyethylene piping and above ground steel piping, Wayne Manufacturing Anodless Riser or equal. Field fabricated risers of wrapped or coated steel pipe will not be allowed.
- M. Install trace wire continuously attached to top of pipe with tape at 3 foot intervals. Bring trace wire up in valve box and at gas meter and transition to above ground steel pipe.
- N. Joining Polyethylene Pipe:
 - 1. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400°F, alignment, and 75 psi interfacial fusion pressure.
 - 2. Butt fusion joining shall be 100% efficient offering a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used for pressure pipe applications nor in fabrications where shear or structural strength is important. Flanges, unions, grooved-couplers, transition fittings and some mechanical couplers may be used to mechanically connect HDPE pipe without butt fusion. Refer to the manufacturer's recommendations.

3.04 INSTALLATION - VALVES

- A. Valves shall be lubricated before they are put into service.
- B. Center and plumb valve box over valve. Set box cover flush with finished ground surface. Prevent shock or stress from being transmitted through valve box to valve.

3.05 FIELD QUALITY CONTROL

- A. Division 1 Section "Quality Assurance": Field inspection and testing.
- B. Gas lines will be pressure tested to 100 psi for 4 hours minimum.
 - 1. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION 02551

SECTION 02581

UNDERGROUND DUCTS AND MANHOLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Conduit and duct and handholes.

1.03 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ASTM A 48 - Gray Iron Castings.
- C. ASTM C 857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
- D. ASTM C 858 - Underground Precast Concrete Utility Structures.
- E. ASTM C 891 - Installation of Underground Precast Utility Structures.
- F. ASTM C 1037 - Inspection of Underground Precast Utility Structures.
- G. IEEE C2 - National Electrical Safety Code.
- H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- J. NEMA TC 6 - PVC and ABS Plastic Utilities Duct for Underground Installation.
- K. NEMA TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.
- L. NEMA TC 10 - PVC and ABS Plastic Communications Duct and Fittings for Underground Installation.

1.04 SYSTEM DESCRIPTION

- A. Interconnected system of encased conduits, ducts and handholes to distribute low-voltage power.
- B. Conduit and duct routing and handhole locations are shown in approximate locations unless dimensions are indicated. Route and locate as required to complete duct bank system.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, size and locations of openings, and for handholes.
- B. Product Data: Submit for metallic conduit , nonmetallic conduit, ducts and handholes.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual routing and elevations of underground conduit and duct, and locations and sizes of manholes and handholes.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project.

1.07 FIELD SAMPLES

- A. Provide field sample of plastic duct, two each at 2 feet long.

1.08 COORDINATION

- A. Coordinate the work with existing underground utilities and structures.
- B. Coordinate the work with Utility Company requirements. Refer to Section 16210 Service Entrance.

PART 2 - PRODUCTS

2.01 RIGID STEEL CONDUIT

- A. Manufacturers: Refer to Specification Section 16132 Conduit.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Fittings: NEMA FB 1, steel.

2.02 PLASTIC CONDUIT

- A. Manufacturers: Refer to Specification Section 16132 Conduit.
- B. Rigid Plastic Conduit: NEMA TC 2, Schedule 40 PVC, with fittings and conduit bodies to NEMA TC 3.

2.03 HANDHOLES

- A. Manufacturers: Christy Concrete Products Inc, Utility Vault Company.

- B. Precast handhole comprising modular, interlocking sections complete with accessories.
- C. Loading: ASTM C 857, Class H-20, A-8, A-.03.
- D. Shape: Rectangular.
- E. Nominal Inside Dimensions: As indicated
- F. Inside Depth: As indicated.
- G. Wall Thickness: As indicated.
- H. Covers: Non-skid Steel checker plate bolt down fasteners for H20 applications. Molded composite with tamperproof bolt down fasteners for other than H20 applications. Provide covers with a minimum coefficient of friction of 0.5. Provide "logo" on cover to indicate utility. Provide lockable covers with two penta-head bolts and pull slot(s) for easy removal.
- I. Handhole design to include non-settling shoulders.
- J. Provide H20 application handhole with reinforced concrete base.
- K. Where fiberglass handholes are provided, provide die-molded type with pre-cut 6-inch by 6-inch cable entrance at center bottom of each side and fiberglass weatherproof cover with non-skid finish.
- L. Design and test manufactured pull boxes to temperatures of minus 50 degrees F. Provide pull boxes with material compressive strength no less than 11,000 pounds per square inch.
- M. Handholes to be sized per NEC requirements.

2.04 ACCESSORIES

- A. Underground Warning Tape: 4-inchwide plastic tape, detectable type, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Produce working installation drawings indicating routing of conduits and locations of handholes. Routing to be coordinated with all other new and existing on-grade and sub-surface structures and utilities.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.
- C. Verify locations of handholes prior to excavating for installation.
- D. Install undergrounds ducts and manholes identified for Utility Company use in accordance with Utility Company standards.

3.02 EXISTING WORK

- A. Abandoned duct bank will remain in place unless otherwise indicated or specified.
- B. Ensure access to existing duct bank and other installations which remain active and which require access. Modify installation or provide access panel as appropriate.
- C. Extend existing duct bank installations using materials and methods compatible with existing electrical installations, or as specified.
- D. Clean and repair existing duct bank which remains or is to be reused.

3.03 INSTALLATION - DUCT BANK

- A. Install power and communications conduit and duct to locate top of duct bank minimum 36 inches below finished grade. Refer to drawings for typical detail.
- B. Install conduit and duct with minimum slope of 4 inches per 100 feet (0.33 percent). Slope conduit and duct toward manholes and away from building entrances.
- C. Install handholes and pullboxes at maximum 150 feet intervals to facilitate pulling of conductors.
- D. Cut conduit and duct square using saw or pipe cutter; de-burr cut ends.
- E. Insert conduit and duct to shoulder of fittings; fasten securely.
- F. Join nonmetallic conduit and duct using adhesive as recommended by manufacturer.
- G. Wipe nonmetallic conduit and duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- H. Install no more than equivalent of three 90-degree bends between pull points.
- I. Provide suitable fittings to accommodate expansion and deflection where required.
- J. Terminate conduit and duct at manhole entries using end bell.
- K. Stagger conduit and duct joints vertically in concrete encasement 6 inches minimum.
- L. Use suitable separators and chairs installed not greater than 4 feet on center. Secure separators and chairs to trench bottom prior to concrete pour.
- M. Band conduits and ducts together before backfilling or placing concrete.
- N. Securely anchor conduit and duct to prevent movement during concrete placement.
- O. Place concrete under provisions of Section 03300.
- P. Use mineral pigment to color concrete red.
- Q. Provide suitable pull string in each empty duct except sleeves and nipples.

- R. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
- S. Backfill trenches under provisions of Section 02324.
- T. Interface installation of underground warning tape with backfilling. Install tape 6 inches below finished surface.

3.04 INSTALLATION - PRECAST HANDHOLES

- A. Handhole application schedule: H20 for Roadways, parking lots and driveways, A8 for sidewalk, A.03 for greenbelt (landscaped) areas.
- B. Excavate for handhole installation under the provisions of Section 02324, Trenching.
- C. Excavate a minimum of 6" deeper than the depth of the box.
- D. Install and seal precast sections in accordance with ASTM C 891.
- E. Install handholes plumb.
- F. Use precast neck and shaft sections to bring cover to finished elevation.
- G. Install in accordance with manufacturer's written instructions. Provide a minimum of 6" depth of crushed gravel bed below handhole.
- H. Provide a minimum of 4" fine sand in bottom of handhole.
- I. Backfill handhole excavation under the provisions of Section 02324, Trenching.

END OF SECTION 02581

SECTION 02607

MANHOLES AND COVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Modular precast concrete manhole sections with tongue-and-groove joints, covers, anchorage, and accessories.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Subdrainage Systems."
 - 5. Division 2 Section "Stormwater Treatment System."
 - 6. Division 2 Section "Storm Drainage."
 - 7. Division 2 Section "Site Sanitary Sewer Systems."

1.03 REFERENCES

- A. City of Santa Cruz Standard Details
- B. City of Santa Cruz Standard Specifications, Technical Provisions
- C. ASTM A48: Gray Castings
- D. ASTM C478: Precast Reinforcing Concrete Manhole Sections.
- E. ASTM C923: Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in manholes and covers including materials, excavation, backfill, compaction, and installation of manholes and covers as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for storm drain manhole or sanitary sewer manhole and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Provide manhole covers, component construction, features,

configuration and dimensions.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of three years documented experience.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.
- B. Manholes: Manholes shall be constructed from pre-cast manhole sections as specified in the City of Santa Cruz Standard Specifications and as shown on the City of Santa Cruz Standard Detail "Standard Manhole".
- C. Joint Sealer: Joint Sealer shall be a pre-molded plastic joint sealer, Ram-Nek or approved equal.

2.02 COMPONENTS

- A. Lid and Frame: ASTM A48, Class 30B, cast Iron construction, machined flat bearing surface lid designed for traffic loading.
- B. Manhole Steps: Formed galvanized steel rungs; $\frac{3}{4}$ inch diameter. Formed integral with manhole sections.
- C. Base Pad: cast in place concrete of type specified in Division 3 Section "Cast-in-Place Concrete."

2.03 CONFIGURATION

- A. Shape: Cylindrical.
- B. Clear Inside Dimensions: As indicated on plans.
- C. Design depth: As indicated on plans.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify items provided by other sections of work are properly sized and located.
- B. Verify that built-in items are in proper location and ready for roughing into work.

- C. Verify excavation for manholes is correct.

3.02 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections

3.03 PLACING MANHOLE SECTIONS

- A. Manhole Bases: Manhole bases must be constructed with particular care in order to maintain a constant channel section at a uniform slope through the manhole. If possible, the channels shall be formed by leaving the sewer pipes in place and pouring a base to a depth of one-half (1/2) the diameter of the pipe. The remainder of the concrete base within the manhole shall be sloped down toward the pipe channel at a slope of approximately two (2) inches per foot in order that a person will be able to stand upon it. When the concrete base is set sufficiently, but not sooner than twenty-four (24) hours after pouring, the top half of the sewer pipe shall be broken away and the entire bottom of the manhole plastered smooth with Portland Cement mortar. If is not possible to leave the sewer pipes in place, the channel shall be formed by shaping the concrete base to the proper cross section.
- B. Pre-cast manhole sections for shall be set level and in proper alignment with adjacent sections. For storm drain manholes, before a pre-cast section is paced, the joint shall be thoroughly cleaned and moistened and Portland Cement mortar placed in the joint so that when the section is placed into position the mortar will be squeezed out all around. All storm drain manhole joints shall be filled with mortar and smoothed.

Sanitary sewer manhole joints shall be constructed with a pre-molded plastic joint sealer to form a watertight joint. Prior to placement of the joint sealer the joint surfaces shall be primed in accordance with the recommendations of the sealer manufacturer. Upon completion of the installation, excess joint sealer shall be trimmed flush with the inside and outside surface of the manhole.

- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections
- D. Drop inlet connections shall be installed wherever the elevation of the invert of the entering sewer is two (2) feet or more above the invert of the main sewer. Drop inlet connection pipes shall be the same size as the inlet sewer pipes.
- E. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.
- F. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required
- G. Manhole frames and covers shall be provided for each manhole. Set cover frames and covers level without tipping, to correct elevations and in the same plane as the finished surface of the roadway.
- H. Coordinate with other sections of work to provide correct size, shape, and location.

END OF SECTION 02607

SECTION 02620
SUBDRAINAGE SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Requirements for providing underground subdrainage systems, including footing drainage system.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion control."
 - 6. Division 2 Section "Stormwater Treatment System."
 - 7. Division 2 Section "Site Sanitary Sewer Systems."
 - 8. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California," authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. State Standard Specifications, 2002 Edition, Section 68: Subsurface drains and Section 88: Engineering Fabrics.
- C. ASTM D2321: Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- D. ASTM D2729: Perforated Polyvinyl Chloride Pipe
- E. ASTM D3034: Poly vinyl chloride (PVC) Sewer Pipe and Fittings.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in underground subdrainage systems including materials, trenching, excavation, backfill, compaction, installation of fittings, installation of subdrainage system, and connection to site storm drainage system as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the contract prices paid for

the various items of work in which underground subdrainage systems are involved and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Furnish product data for each type of foundation drainage material required.
- B. Shop Drawings: Show layout and interfacing with total site drainage system.
- C. Certification: Signed by Contractor and installer that materials conform to specified requirements and were successfully checked and tested prior to covering with filtering and drainage fill.

1.06 COORDINATION

- A. Coordinate foundation drain work with adjacent earthwork backfilling operations.

PART 2 - PRODUCTS

2.01 DRAINAGE AND PIPE FITTINGS

- A. Furnish drainage pipe complete with bends, reducers, adapters, couplings, collars, and joint materials.
- B. Perforated Polyvinyl Chloride Pipe: ASTM D2729
- C. Joint Screening: Synthetic drainage fabric shall be in accordance with Caltrans Standard Specifications, Section 68: Subsurface Drains and Section 88: Engineered Fabrics.

2.02 SOIL MATERIALS

- A. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense composite.
- B. Drain rock: $\frac{3}{4}$ -inch x $\frac{1}{2}$ -inch clean crushed rock. 100 percent passing the $\frac{3}{4}$ -inch sieve and 0-5 percent passing the No. 4 sieve.
- C. Filtering Material: Caltrans Class 2 Permeable Material.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Impervious Fill at Footings: After concrete footings have been cured and forms removed, place impervious fill material on subgrade adjacent to and 3 inches above footing as indicated. Compact minimum 6 inches deep and 12 inches wide.
- B. Filtering Material: Place supporting layer of filtering material over compacted subgrade where drainage pipe is to be laid, and compact to a depth not less than 4 inches, or as indicated. After testing drain lines, place additional filtering material to a

4-inch depth around sides and top of drains.

- C. Laying Drain Pipe: Lay drain pipe solidly embedded in filtering material to true grades and alignment, and continuous slope in direction of flow. Provide full bearing for each pipe section through out its length.
 - 1. Lay perforated pipe with perforations down and joints tightly closed in accordance with pipe manufacturer's recommendations. Provide collars and coupling as required.
 - 2. Provide recesses in excavation bottom to receive bells for drain pipe having bell and spigot ends. Lay pipe with bells facing upslope with spigot end entered fully into adjacent bell.
- D. Testing Drain Lines: test or check lines before backfilling. Remove obstructions, replace damaged components, and retest system until satisfactory results are obtained.
 - 1. After testing drain lines, place additional filtering material to a depth of 4 inches around sides and top of drains.
- E. Drainage Fill: Place drainage fill over drain lines after testing and covering with filtering material. Cover to a minimum width of 6 inches on each side, and above top of pipe to within 12 inches of finish grade. Place fill material in layers not exceeding 3 inches in loose depth, and compact.
 - 1. Overlay top of drainage fill material with one layer of 15-pound asphalt saturated felt or synthetic drainage fabric; overlap edges at least 4 inches.
- F. Fill to Grade: apply fill material over compacted drainage fill at footing drains, placing material in layers not exceeding 6 inches in loose depth and compact. Carry fill to finish elevations and slope away from building.

END OF SECTION 02620

SECTION 02630
STORM DRAINAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. On-Site and off-site storm drainage, drainage piping, cleanouts, fittings and accessories, and bedding.
 - 2. Catch basins, manholes, under building drains, paved area drainage, site surface drainage, rainwater leaders, trench drains, all frames, grates and covers.
 - 3. Connection of drainage system to municipal drainage system.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Manholes and Covers."
 - 7. Division 2 Section "Subdrainage Systems."
 - 8. Division 2 Section "Stormwater Treatment System."
 - 9. Division 2 Section "Site Sanitary Sewer Systems."
 - 10. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report titled "Geotechnical Investigation, Santa Cruz Metropolitan Transit District, Service, Operations and Maintenance Facilities, Santa Cruz, California." Prepared for: RNL Interplan, Inc., authored by Cotton, Shires & Associates, Inc. and dated April 2004.
- B. City of Santa Cruz Standard Details
- C. City of Santa Cruz Standard Specifications, Technical Provisions, Section 11: Construction of Sanitary Sewers, Storm Drains and Appurtenances
- D. Caltrans Standard Specifications, Section 65: Reinforced Concrete Pipe
- E. ASTM D2321: Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- F. ASTM D3034: Poly vinyl chloride (PVC) Sewer Pipe and Fittings.
- G. ASTM C-76: Reinforced Concrete Sewer and Drainage Pipe

- H. AASHTO M252: Specification for Corrugated Polyethylene Drainage Tubing, 3- to 10-inch Diameter
- I. ASTM D1056: Specification for Flexible Cellular Materials – Sponge or Expanded Rubber
- J. ASTM D1248: Specification for Polyethylene Plastics Molding and Extrusion Materials
- K. ASTM D3350: Specification for Polyethylene Plastics Pipe and Fittings Materials
- L. ASTM D2321: Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
- M. AWWA C104: American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- N. AWWA C111: American national Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- O. AWWA C151: American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
- P. AWWA C600: Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in storm drain pipe installation including materials, trenching, excavation, backfill, compaction, installation of fittings, installation of storm drain pipes, installation of rainwater leaders, and connection to storm drain manholes and catch basins as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for the individual storm drain pipe sizes installed on the project and no additional compensation will be allowed therefor.
- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in storm drain catch basins including materials, trenching, excavation, backfill, compaction, installation of storm drain catch basins, and installation of grates as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for catch basin and no additional compensation will be allowed therefor.
- C. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in trench drains including materials, trenching, excavation, backfill, compaction, installation of trench drains, and installation of grates as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit prices paid for trench drain and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating pipe, pipe accessories, trench drain, manhole, and catch basin.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations on as-built drawings.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.
- B. For work within the City of Santa Cruz Right-Of-Way:
 - 1. Storm drains, manholes, catch basins, cleanouts and service connections shall conform accurately to the Standard Details and Specifications of the City of Santa Cruz. The City Engineer or his/her representative will inspect the installation of all pipelines and facilities and must approve them prior to backfilling. Any facilities installed or backfilled prior to approval or without the City Engineer's knowledge are subject to rejection for that reason.
 - 2. Pursuant to Section 6422 of the "Labor Code" of the State of California, and the City of Santa Cruz Standard Specifications, before the excavation of any trench or trenches, four feet or more in depth, the Contractor shall submit a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards, established by the construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer. No excavation shall be started until said plan has been approved by the City Engineer.
 - 3. No construction shall commence until construction drawings have been signed by the City Engineer.

1.08 COORDINATION

- A. Coordinate with work performed under other sections.
- B. Coordinate the Work with termination of storm sewer connection outside building, trenching, and connection to foundation drainage system.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.01 DRAINAGE PIPE MATERIALS

- A. The prescribed sizes of pipes are nominal inside diameters. Pipes shall be of the size and length shown on the plans.
- B. Reinforced Concrete Pipe: Reinforced concrete sewer and drainage pipe shall conform to ASTM designation C-76, Class 111.

Joints shall be rubber gasketed joints conforming to the requirements of ASTM C 443M and shall be flexible and able to withstand expansion, contraction and settlement.

- C. Plastic Pipe: ASTM D3034, Polyvinyl Chloride material; inside nominal diameter as shown on plans, bell and spigot style rubber ring sealed gasket joint end.
- D. Smooth Interior Corrugated Polyethylene Pipe (HDPE): HDPE shall be high density polyethylene corrugated exterior/smooth interior pipe. Four- through 10-inch diameters shall meet all the requirements of AASHTO M252 and M294 with the addition that the pipe shall have a smooth interior liner.
 - 1. Material shall meet ASTM D1248 Type III, Category 4, Grade P33, Class C; or ASTM D3350 Cell Classification 324420C.
 - 2. Coupling Bands: Coupling Bands shall be gasketed, water tight and cover at least one full corrugation on each section of pipe. The gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Type 2. Gaskets shall be installed on the coupling band by the pipe manufacturer. All coupling bands shall meet or exceed the soil-tightness requirement of the AASHTO Standard Specification for Highway Bridges, Section 23, paragraph 23.3.1.5.4(e).
 - 3. Pipe fittings shall conform to AASHTO M252 or AASHTO M294.
- E. Ductile Iron Pipe shall be cement lined and bituminous coated with rubber-gasket joints in conformance with AWWA C104, AWWA C111, and AWWA C151.
- F. Iron Castings shall conform to ASTM Designation A-489 (Grade 30) for gray iron castings. Frames and covers shall be of the dimensions and weights shown on the plans and City of Santa Cruz Standard Details and the weight of each frame and cover shall be indicated thereon in white paint. The castings shall be free from cracks, blow holes or other imperfections, be straight, true to pattern, and have a professional finish.
- G. Manholes shall conform the City of Santa Cruz Standard Details and be fabricated from pre-cast concrete manhole section conforming to ASTM Designation C-476, Class II, and rated for H-20 traffic loading.

- H. Manhole Frames and Covers shall conform to the City of Santa Cruz Standard Manhole and Cover Details, and be and rated for H-20 traffic loading. The bottom rim of the cover and the seat shall be a matched set, so milled that the cover will set evenly and firmly on the frame. Where manhole covers occur in sidewalk surfaces, the covers shall conform to the above in dimensions and weight but shall have a surface formed to provide a non-slip level walking surface approved by the City Engineer.

- I. Concrete for manhole bases and other structures shall conform to the State Standard Specifications for Type B concrete and shall be composed of maximum 1-1/2" aggregate and 5 sack per cubic yard of cement. Maximum slump of the concrete shall not exceed 4 inches.

2.02 ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- B. Trace Tape: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Storm Sewer Service" in large letters.
- C. Tracer Wire: 10 AWG Copper Wire.

2.03 CATCH BASINS, DRAINAGE INLETS, AND MANHOLES

- A. Lid and Frame: H-20 Traffic rated welded steel in traffic areas, galvanized or ductile iron, ADA approved and bicycle proof where located in areas of possible pedestrian use.
- B. Nominal Lid and Frame Size: As shown on plans.
- C. Catch basins and manholes shall be precast concrete boxes in conformance with ASTM C478 and rated for H-20 traffic loading.
- D. Catch basins shall be constructed in conformance with City of Santa Cruz Standard Details for the catch basin specified on the plans. If no particular basin is specified, a single Type B catch basin shall be required.
- E. Atrium Grates and Inlets shall be as manufactured by NDS or equal approved by the Engineer in writing.
- F. Manhole frames and covers shall conform to Division 2 Section "Manholes and Covers."

2.04 TRENCH DRAINS

- A. All trench drains shall be:
 - 1. 6" wide POLYCAST 600 Series Presloped Trench Drain System or equal.
 - 2. Polyester polymer concrete.
 - 3. Grates shall be Double Stainless Steel Perforated, POLYCAST Part No. DG0657R or equal, and ADA compliant. Grating hold-down device shall be POLYCAST Part No. DA0642S

2.05 CLEANOUTS

- A. Cleanout Lid and Frame: Cast iron construction, as detailed on the plans.
- B. Base Pad: Cast in place concrete of type specified in Division 3 Section Cast-in-Place Concrete," per detail in drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.
- B. Excavate and backfill pipe trench in accordance with Division 2 Section "Trenching," for work of this section.
- C. All delivered pipe and appurtenances shall be inspected. Damaged pipe and materials shall not be accepted.

3.02 INSTALLATION - PIPE

- A. Moving Existing Utilities: The Contractor shall notify the utility company before proceeding with construction and shall be familiar with the underground pipes, ducts or manholes. The Contractor shall be responsible for damage to, or damage resulting from, disturbance of underground or overhead utilities.
 - 1. The location of utilities shown on the plans is approximate only and shall not be taken as final. The cost of relocating existing utilities will normally be borne by the individual utility company.
 - 2. Sufficiently early notice must be given prior to construction to allow ample time for the required changes.
- B. Installing Storm Drain Pipe:
 - 1. All pipe shall be laid continuously up-hill commencing at the lowest manhole or outlet of the system, thence from manhole to manhole, with the socket end up-grade. When two storm sewers of different sizes meet, the pipe shall be laid so that the crowns of the pipe are at the same elevation and the invert of the largest pipe shall be dropped below the invert of the smaller pipe unless the plans show otherwise at a specific location. Batter boards shall be installed directly above the pipe location and string lines stretched between the batter boards. The strings shall be elevated above the pipe line several feet above the pipe so that the string will have the same slope as the pipeline. The string shall be used for checking the elevation of the bottom of the trench and the invert of each length of pipe as it is laid. Another string line shall be installed in the bottom of the trench beside the pipeline to be used for aligning each length of pipe as it is installed in the trench.
 - 2. The surface of the trench shall be shaped so as to support the pipe accurately to line and grade. Wedging or blocking of pipes will not be permitted. The face of the spigot ends and of all shoulders or sockets must be true and brought into fair contact and all lumps and excrescences of said faces shall be cut away before the pipe is lowered into the trench. When work ceases for any reason, the unfinished end of the pipe shall be securely closed with a plug or cover to prevent entrance of debris.
- C. Joints: Care shall be taken to keep the bell end spigot clean and dry prior to joining the pipe. Bell holes shall be provided such that the pipe's weight does not rest on the bell.
 - 1. Careful inspection of each joint shall be made and none of the joints covered until

approved by the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, until approved by the City Engineer or an authorized representative.

2. Joining Reinforced Concrete Tongue and Groove Pipe:
 - a. Proper facilities shall be provided for lowering the sections of pipe into the trench. The pipe shall be laid carefully to the lines and grades on the drawings, the sections fully and closely jointed by means of stiff cement, enough to form a durable watertight joint.
 - b. The Cement mortar shall be such that it will adhere readily to the pipe and can be easily squeezed out at the joints. Admixtures not in excess of ten (10) percent by volume of the cement may be added, but if hydrated or quicklime is used, the amount shall not exceed five (5) percent. All mortar shall be used within thirty (30) minutes after mixing with water and all parts of the pipe to be in contact with mortar shall be washed clean and thoroughly wetted in insure proper bond.
 - c. The first pipe (downstream) shall be bedded to establish line and grade with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and the resulting space filled with mortar, into which the end of the second pipe beds when laid. The groove end of the first pipe shall be thoroughly cleaned with a wet brush and a layer of soft mortar applied to the lower half of the groove. The tongue end of the second pipe shall be thoroughly cleaned with a wet brush and while in a horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall then be inserted into the groove end of the first pipe until the mortar is squeezed out on the interior and exterior surfaces. The interior surface of the pipe at the joint shall be brushed smooth, and the exterior of the joint shall be completely filled. For pipes 24-inches inside diameter and smaller, a band of mortar shall be carefully applied to each joint completely around the pipe and joining the mortar placed in the excavation beneath the joint. The bond shall be carefully shaped and smoothed. For pipes 27-inches and larger, the interior joints shall be filled from inside the pipe with mortar applied not less than 12 hours after the pipe has been placed. The completed exterior pipe joints shall be immediately protected from air and sun with an initial covering of moist earth, sand, canvas, burlap or curing compound. If not backfilled at once, the initial covering shall be kept moist for at least forty-eight (48) hours. An approved curing compound may be applied as a substitute for backfilling. In order to prevent the mortar from setting up too rapidly, the ends of the pipe shall be covered in such a manner as to prevent the flow of air during the time the mortar is in a plastic condition.
 - d. The interior of the pipe shall be kept free from dirt, excess mortar, and other foreign material as the pipe laying progresses and left clean at the completion of the culvert. Any pipe which is not in true alignment or which shows any undue settlement after laying, or is damaged, shall be taken up and re-laid at the Contractor's expense.
 3. Joining of pipes not herein specifically described shall be done strictly in accordance with manufacturer's specifications and instruction of the Engineer and, in the case of work within the City of Santa Cruz Right-Of-Way, instruction of the City Engineer.
- D. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight.

- E. Backfill for HDPE pipe shall be ASTM D2321 Class I, II, or III soils, or USCS material corresponding to these ASTM designations. Backfill material shall be placed in 6-inch lifts and compacted to 95 percent minimum density per AASHTO T99.
- F. Place pipe between stationed structures and per trench detail on plans.
- G. Lay pipe to slope gradients noted on drawings with maximum variation from true slope of 1/16 inch in 10 feet. Slope positively to drain.
- H. Connect to rainwater leader downspouts and foundation subdrains. Provide cleanouts as required for access for cleaning to all underground rainwater leaders and storm drains.
- I. Install trace wire continuous over top of pipe above pipe line.

3.03 INSTALLATION - STRUCTURES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Scarify and recompact 8" of native material to 95% relative compaction.
- C. Level top surface of recompact native material using 3-inch layer of Class 3 Aggregate Base.
- D. Level top surface of base pad; sleeve concrete shaft sections to receive storm drain pipe sections.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated.
- F. Cut pipe flush with face of catch basin and mortar wall smooth at pipe penetration.
- G. The top of the catch basin frame shall be installed level with the top of curb. The flow line of the gutter adjacent to the catch basin shall drop off two (2) inches within the last eight (8) feet of gutter leading to the catch basin.
- H. It is preferable to place the curb, gutter and sidewalk up to within 8 feet on each side of the catch basin, place the frame, then form and place the remaining curb, gutter and sidewalk.
- I. The bottom of catch basins shall be slopes sufficiently and finished smoothly to prevent standing water at the bottom.
- J. Catch basins and storm drain manholes shall be made water tight at joints and pipe penetrations using gaskets or mortar.
- K. Refer to Division 2 Section "Manholes and Covers," for manhole requirements.

3.04 FIELD QUALITY CONTROL

- A. Request inspection prior to and immediately after placing cover over pipe. Provide a minimum of 72 hours.

- B. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.05 PROTECTION OF FINISHED WORK

- A. Protect pipe and bedding material from damage or displacement until backfilling operation is in progress.

END OF SECTION 02630

SECTION 02721

STORMWATER TREATMENT SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Precast concrete stormwater treatment systems, grates and covers, connection to storm drainage system, and bedding.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Excavation."
 - 3. Division 2 Section "Backfill."
 - 4. Division 2 Section "Trenching."
 - 5. Division 2 Section "Erosion Control."
 - 6. Division 2 Section "Manholes and Covers."
 - 7. Division 2 Section "Storm Drainage."
 - 8. Division 3 Section "Cast-in-Place Concrete."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report referenced in "DOCUMENT 00320 - GEOTECHNICAL INVESTIGATION INFORMATION."
- B. Caltrans Standard Specifications, Section 25: Aggregate Bases
- C. ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- D. ASTM C150: Standard Specification for Portland Cement
- E. ASTM C595M: Standard Specification for Blended Hydraulic Cements
- F. ASTM C857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- G. ASTM C858: Standard Specification for Underground Precast Concrete Utility Structures
- H. ASTM C891: Installation of Underground Precast Concrete Utility Structures
- I. ASTM C990: Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in stormwater treatment systems including materials, excavation, backfill, compaction, installation of stormwater treatment tank, connecting to storm drain system, and installation of manhole and covers as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for stormwater treatment system and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Design calculations and shop drawings shall be certified by a Professional Engineer retained by the system manufacturer or contractor and licensed in the state where the system is to be installed.
- B. Product Data: Provide data indicating stormwater treatment tank and accessories.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Accurately record actual locations of stormwater treatment tanks and invert elevations on as-built drawings.
- F. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.

1.07 COORDINATION

- A. Coordinate with work performed under other sections.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.09 QUALITY ASSURANCE

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site

shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days when tested in 3 inch diameter by 6 inch long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete for precast stormwater treatment systems shall conform to ASTM C857 and C858.
- B. The wall thickness shall not be less than 6" or as indicated. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 loading requirements as determined by a Licensed Professional Engineer.
- C. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C990.
- D. Cement shall be Type II Portland cement conforming to ASTM C150.
- E. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with hydraulic cement conforming to ASTM C595M.
- F. Internal metal components shall be aluminum alloy 5052-H32 in accordance with ASTM B209.
- G. Manhole frames and covers shall conform to Division 2 Section "Manholes and Covers."
- H. Sealant to be utilized at the base of the swirl chamber shall be 60 durometer extruded nitrile butadiene rubber (Buna N) and shall be provided to the concrete pre-caster for installation.
- I. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi or until 5 days after fabrication and/or repair, whichever is the longer.
- J. A bitumen sealant in conformance with ASTM C990 shall be utilized in affixing the aluminum swirl chamber to the concrete vault. The butyl material shall be 3/4-inch thick by 3/4-inch wide.

- K. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

2.02 PERFORMANCE

- A. Each stormwater treatment system shall adhere to the following performance specifications:
1. Vortechs Model: 7000 (River Street Site):
 - a. Swirl Chamber Diameter: 8 ft.
 - b. Design Treatment Capacity: 6.1 cfs.
 - c. Sediment Storage: 4.0 cyd.
 2. Vortsentry Model: VS70 (Golf Club Drive Site):
 - a. Swirl Chamber Diameter: 7 ft.
 - b. Design Treatment Capacity: 2.4 cfs.
 - c. Sediment Storage: 4.3 cyd.
 3. Each stormwater treatment system shall include a circular aluminum "swirl chamber" (or "grit chamber") with a tangential inlet to induce a swirling flow pattern that will accumulate and store settleable solids in a manner and a location that will prevent re-suspension of previously captured particulates. Each swirl chamber diameter shall not be less than the diameter listed above (neglecting chamber wall thickness).
 4. Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.
 5. Each stormwater treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a 50-micron particle size. Individual stormwater treatment systems shall have the Design Treatment Capacity listed above, and shall not resuspend trapped sediments or re-entrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.
 6. Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in above. The systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.
 7. A water-lock feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.
 8. The stormwater treatment system manufacturer shall furnish documentation which supports all product performance claims and features, storage capacities and maintenance requirements.
 9. Stormwater treatment systems shall be completely housed within one rectangular

structure.

2.03 MANUFACTURER

- A. Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff.
- B. Each stormwater treatment system shall be a Vortechs™ System as manufactured by Vortechics, Inc., 41 Evergreen Drive, Portland, Maine 04103, phone: 207-878-3662, fax: 207-878-8507; and as protected under U.S. Patent # 5,759,415, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.
- B. Excavate and backfill stormwater treatment tank trench in accordance with Division 2 Section "Trenching," for work of this section.

3.02 INSTALLATION

- A. Each Stormwater Treatment System shall be constructed according to the manufacturer's instructions and as specified herein. Install at elevations and locations shown on the plans or as otherwise directed by the Engineer.
- B. Form bottom of excavation clean and smooth to correct elevation.
- C. Scarify and recompact 8" of native material to 95% relative compaction.
- D. Level top surface of recompacted native material using 3-inch Caltrans Class 2 Aggregate Base layer compacted to 95% relative compaction.
- E. Place the precast base unit on a granular subbase of minimum thickness of six inches after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.
- F. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C990-91 along the construction joint in the section that is already in place.
- G. After setting the base and wall or riser sections, prepare to; install the swirl chamber. Place the ¾-inch thick by ¾-inch wide butyl mastic seal vertically on the outside of the swirl chamber starting one inch above the bottom of the swirl chamber and continuing to a height equal to the elevation of the bottom of the upper aperture of the swirl chamber. The butyl mastic seal should abut the downstream side of the pre-drill mounting holes that attach the swirl chamber to the long walls of the concrete vault. Next, install the extruded Buna N seal on the bottom edge of the 180 degree

downstream section of the swirl chamber by first applying a bead of Sikaflex-1a polyurethane elastomeric sealant into the extruded slot then slide the seal onto the swirl chamber. The extruded seal should extend 3-inches upstream of the mounting holes, toward the inlet end of the vault. Set the swirl chamber into position and keep the seal approximately 1/2-inch above the floor of the concrete vault. Apply a continuous bead of Sikaflex-1a sealant under the cupped bottom of the seal. Set the circular swirl chamber on the floor of the vault and anchor it by bolting the swirl chamber using HILTI stainless steel drop-in sedge anchors or equivalent 3/8-inch diameter by 2-3/4—inch minimum length at heights of approximately three inches off the floor and at fifteen inch intervals to approximately the same height of the butyl mastic sealant (at locations of pre-drilled holes in aluminum components). Apply a continuous bead of Sikaflex-1a sealant to the intersection of the inside bottom edge of the extruded seal and the vault floor.

- H. If the oil baffle wall (Baffle A) and flow control wall (Baffle B) are not integrally cast-in to riser/wall sections then the Baffle wall panels shall be placed in the formed keyways or between bolted-in-place angle flanges as provided by the manufacturer. Apply non-shrink grout or Sikaflex-1a sealant to each end of Baffle A and Baffle B at the upstream intersection with the side walls of the concrete vault.
- I. Prior to setting the precast roof section, bitumen sealant equal to ASTM C990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least one inch (1") greater than the nominal gap between the top of the baffle and the roof section.
- J. The nominal gap shall be determined either by field measurement or the shop drawings. After placement of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. Also apply non-shrink grout to the joints at the side edges of the baffle wall.
- K. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a 1/4 inch maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6" lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C891 "Standard Practice For Installation of Underground Precast Utility Structures".
- L. Plug holes in the concrete sections made for handling or other purposes with a nonshrink grout or by using grout in combination with concrete plugs.
- M. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections. Cut pipe flush with face of stormwater treatment tank and mortar wall smooth at pipe penetration.

3.03 QUALITY CONTROL

- A. The quality of materials, the process of manufacture and the finished sections shall be subject to inspection by the Engineer. Sections rejected after delivery to the site shall

be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

- B. All section shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days. Epoxy mortar may be utilized for repairs.
- D. Request inspection prior to and immediately after placing cover over stormwater treatment tank. Provide a minimum of 72 hours.
- E. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D2922.
- F. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.04 PROTECTION OF FINISHED WORK

- A. Protect stormwater treatment tank and bedding material from damage or displacement until backfilling operation is in progress.

END OF SECTION 02721

SECTION 02740

FLEXIBLE PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Provide asphalt concrete paving for the following applications:
 - a. On-site asphalt concrete parking areas.
 - b. Off-site roadway asphalt concrete overlays.
 - c. Off-site roadway asphalt concrete pavement patches and repairs.
 - d. Asphalt concrete access roadways.
 - e. Pavement repair at excavations for trenches.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Existing Plants to Remain."
 - 3. Division 2 Section "Excavation."
 - 4. Division 2 Section "Backfill."
 - 5. Division 2 Section "Trenching."
 - 6. Division 2 Section "Erosion Control."
 - 7. Division 2 Section "Rigid Pavement."
 - 8. Division 2 Section "Pavement Markings and Striping."
 - 9. Division 2 Section "Site Water Lines."
 - 10. Division 2 Section "Natural Gas Distribution."
 - 11. Division 2 Section "Subdrainage Systems."
 - 12. Division 2 Section "Stormwater Treatment System."
 - 13. Division 2 Section "Storm Drainage."
 - 14. Division 2 Section "Site Sanitary Sewer Systems."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report referenced in "DOCUMENT 00320 - GEOTECHNICAL INVESTIGATION INFORMATION."
- B. Caltrans Standard Specifications, 2002 Edition, Section 39, "Asphalt Concrete", Section 84-3, "Painted Stripes and Pavement Markings", Section 88, "Engineering Fabrics", and Section 92, "Asphalts," excepting the Measurement and Payment sections contained therein.
- C. City of Santa Cruz Standard Specifications, Technical Provisions, Section 12: Construction of Streets.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing vehicular asphalt concrete paving work including materials, pavement cutting, placement and compaction of aggregate base course, and asphalt concrete installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for vehicular asphalt concrete pavement and no additional compensation will be allowed therefor.
- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing asphalt concrete overlays work including materials and asphalt concrete installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for asphalt concrete overlay and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Asphalt concrete mix designs.
- B. Certificate of compliance with Caltrans specifications if requested by Owner's Representative.
- C. In the case of work within the City of Santa Cruz Right-Of-Way, aggregate samples shall be submitted to the City Engineer for testing and approval prior to use.

1.06 REGULATORY REQUIREMENTS

- A. All work, material, procedures and practices under this section shall conform to requirements of the California Air Resources Board (CARB) and the Monterey Bay Unified Air Pollution Control District.

1.07 QUALITY ASSURANCE

- A. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for at least three years.
- B. Use only experienced workers and installers.
- C. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- D. Water test completed pavement.
 - 1. Pavement shall drain without the formation of puddles or birdbaths. Remove and replace pavement that does not comply.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The asphalt concrete shall conform to the following requirements:

1. Asphalt concrete shall be Type B in conformance with the provisions in the Caltrans Standard Specifications, 2002 Edition, Section 39, "Asphalt Concrete," and these special provisions.
 2. The aggregate for Type B asphalt concrete shall conform to the 1/2" maximum, medium grading specified in the Caltrans Standard Specifications, 2002 Edition, Section 39-2.02, "Aggregate," and these special provisions. For work within the City of Santa Cruz Right-Of-Way, for surfaces greater than 2 inches in depth, the asphalt concrete shall be placed in two layers, the bottom layer of which may be 3/4" maximum aggregate. It shall conform to medium grading.
 3. The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.
 4. The spreading and compacting requirements of the Caltrans Standard Specifications, 2002 Edition, Section 39-6, "Spreading and Compacting," shall apply.
 5. Asphalt concrete shall be produced at a central mixing plant.
 6. The amount of asphalt binder to be mixed with the aggregate shall be between 4 percent and 7 percent, by weight, of the dry aggregate.
- B. Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.
- C. Paint binder (tack coat) shall be, at the option of the Contractor, either slow setting type asphaltic emulsion, rapid setting asphaltic emulsion or paving asphalt. Slow-setting type asphaltic emulsion and rapid setting asphaltic emulsion shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder, the grade will be determined by the Engineer. Paving asphalt shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 92, "Asphalts," of the Standard Specifications.
- D. Pavement reinforcing fabric, where called for on the plans, shall conform with Caltrans Standard Specifications, 2002 Edition, Section 39-4.03, "Pavement Reinforcing Fabric," and Section 88-1.02, "Pavement Reinforcing Fabric."
- E. Prime coat of liquid asphalt, SC-70 or SC-250, shall be placed on aggregate base before placing asphalt concrete.
- F. Seal Coat Materials shall conform to the requirements of the section entitled "Bituminous Seals" of the State Standard Specifications except as herein modified. The particular type of seal coat, size and amount of materials shall be as specified on the plans or special conditions.
- G. Bituminous binder for the fog seal shall be S.S.I mixing type asphalt emulsion mixed with equal parts water by volume.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Place asphalt concrete only during periods of fair weather when the free air temperature is above 50 deg F.

3.02 PAVEMENT SAWCUTTING

- A. Saw cut existing pavement in straight lines (using a concrete saw) to a minimum depth equal to or greater than one half the thickness thereof. Should voids develop under the existing pavements during construction, those affected pavements shall be neatly sawcut in straight lines and replaced after the voids have been filled.
- B. Any pavement damaged by demolition activities shall be sawcut and restored at the expense of the Contractor.

3.03 INSTALLATION

A. Asphalt Concrete:

- 1. Remove loose material from compacted base. Proof roll and check for areas requiring additional compaction. Spreading and compacting shall be performed by methods that will produce an asphalt concrete surfacing of uniform smoothness, texture and density, which does not allow water to pond. Report unsatisfactory conditions in writing to Owner's Representative.
- 2. Apply prime coat to prepared base 24 hours before paving at a rate of 0.10 to 0.25 gallon per square yard.
- 3. Apply tack coat to previous laid work not to receive pavement reinforcing fabric, and vertical surfaces at a rate of 0.05 to 0.15 gallon per square yard. Tack coat shall be applied uniformly and be allowed to cure before placement of asphalt concrete.
- 4. Place asphalt concrete in maximum 3 lifts at minimum temperature of 250 degrees F in strips not less than 10 feet wide overlapping previous strips.
- 5. Test in-place asphalt work for thickness and smoothness. Remove and replace defective work and patch to eliminate evidence of patching.
- 6. Begin rolling when pavement can withstand weight of roller. Roll while still hot to obtain maximum density and to eliminate roller marks. Finished pavement thickness shall be as shown on plans.

B. Placing Asphalt Concrete Surfacing within the City Of Santa Cruz right-Of-Way.

- 1. The thickness of the asphalt concrete surfacing shown on the plans or standard detail shall be considered the minimum thickness to be applied at any point on the street and sufficient thickness must be allowed prior to compacting to provide the necessary thickness after compaction.
- 2. Mixing, transporting, placing and compacting asphalt concrete surfacing shall conform to the requirements of Section 37 of the State Standard Specifications except as herein modified.
- 3. The mixture shall be laid on a dry surface and never while it is raining. Unless permitted by the City Engineer, the mixture shall be spread by means of a mechanical self-powered paver with a tamping bar and distributing screws to provide a well distributed compacted surface.
- 4. Sufficient personnel shall be provided so that irregularities can be filled and leveled to the satisfaction of the City Engineer. When permitted to spread asphalt concrete by hand, sufficient well equipped rakers and shovelers must be available to provide a level and uniform finished joint.
- 5. The roller shall make its first pass with the heavy wheel forward whenever possible. The joint between strips of paving shall be rolled carefully to assure a uniform density at the finished joint.

6. A Fog Seal shall be applied to all new plant-mixed surfaces.

C. Paint Binder:

1. The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

D. Fog Seal:

1. A Fog Seal Coat shall be applied to all new asphalt concrete surfaces.
2. Apply fog seal at a temperature between 70°F and 130°F at a rate of 0.10 to 0.20 gallons per square yard to new asphalt concrete. Do not apply if weather conditions are unsuitable, or if atmospheric temperature is below 55°F. Protect work until seal has cured.

E. Applying Seal Coats within the City of Santa Cruz Right-Of-Way:

1. Fog Seals to be applied to new asphalt concrete surfaces shall be applied in amounts approved by the City Engineer. The amounts of emulsified asphalt shall be approximately 0.035 gallons per square yard of surface for a total of 0.070 gallons of emulsion and water mixture per square yard of surfacing.
2. All seal coats, including the Fog Seal, shall be applied in conformity with Section 37 of the State Standard Specification except as herein modified.
3. Particular attention shall be given to the temperature of the existing surface to which the seal coat is to be applied. Seal coating shall not begin early in the morning when the pavement surface is cold without permission from the City Engineer. Care must be taken to assure immediate application of rock chips or sand after spreading the asphalt.

F. Tolerances:

1. Flatness: Maximum variation of 1/4 inch, measured with a ten-foot straight edge.
2. Compacted thickness: Within 1/4 inch.
3. Variation from specified finished elevation: Within 1/2 inch.
4. Pavement shall match existing at all patches and conforms.
5. If the finished surface of the asphalt concrete does not meet the specified surface tolerances, the surfacing shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat on the areas which have been ground), (2) removal and replacement or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.
6. If abrasive grinding is used to bring the finished surface to the specified surface tolerances, additional grinding shall be performed, as necessary, to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. Ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42 2.02, "Construction," of the Caltrans Standard Specifications, 2002 Edition.

END OF SECTION 02740

SECTION 02750

RIGID PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. This Section includes the following:
 - 1. Vehicular concrete pavement in parking lots.
 - 2. Concrete curbs and gutters
 - 3. Accessible curb ramps
 - 4. Concrete sidewalks
 - 5. Portions of existing concrete walks demolished for utility routing
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 1 Section "Quality Control."
 - 3. Division 2 Section "Existing Plants to Remain."
 - 4. Division 2 Section "Excavation."
 - 5. Division 2 Section "Backfill."
 - 6. Division 2 Section "Erosion Control."
 - 7. Division 2 Section "Flexible Pavement."
 - 8. Division 3 Section "Concrete Formwork."
 - 9. Division 3 Section "Concrete Reinforcement."
 - 10. Division 3 Section "Cast-in-Place Concrete."
 - 11. Division 7 Section "Joint Sealants."

1.03 REFERENCES

- A. The Contractor's attention is directed to the recommendations contained in the report referenced in "DOCUMENT 00320 - GEOTECHNICAL INVESTIGATION INFORMATION."
- B. City of Santa Cruz Standard Specifications, Technical Provisions, Section 10: Construction of Concrete Curbs, Gutters, Sidewalks and Valley Gutters.
- C. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- D. ASTM A185: Reinforcement.
- E. ASTM C33: Concrete Aggregates.
- F. ASTM C94: Ready Mix Concrete.
- G. ASTM C150: Portland Cement

- H. ASTM C260: Air Entraining Admixtures for Concrete.
- I. ASTM C494: Chemical Admixtures for Concrete.
- J. ASTM D1751: Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- K. ASTM D1752: Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing vehicular concrete pavement including materials, pavement cutting, placement and compaction of aggregate base course, and concrete pavement installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for vehicular concrete pavement and no additional compensation will be allowed therefor.
- B. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing concrete curbs and gutters including materials, formwork, concrete curb and gutter cutting, placement and compaction of aggregate base course, and concrete curb and gutter installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for curb and gutter and no additional compensation will be allowed therefor.
- C. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing accessible curb ramps including materials, formwork, placement and compaction of aggregate base course, and concrete installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for accessible ramp and no additional compensation will be allowed therefor.
- D. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing concrete sidewalks including materials, formwork, placement and compaction of aggregate base course, and concrete installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for concrete sidewalk and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product data: Furnish for Proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, and other materials requested by Owner's Representative.
- B. Submit mix design and product data: Provide data on joint filler, admixtures curing compounds, backer rod, handrail sleeves, and stair nosing strips.

- C. Laboratory Test Reports: Submit evaluation of concrete materials and mix design tests.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 318.
- B. Perform work in accordance with City of Santa Cruz, Standard Specifications, Technical Provisions, Section 10: Construction of Concrete Curbs, Gutters, Sidewalks and Valley Gutters.
- C. Obtain cementitious materials and aggregates from same source throughout.
- D. Concrete Manufacturer: Complying with ASTM C94 requirements for production facilities and equipment.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable local codes and standards.
- B. General: Concrete curbs, gutters, sidewalks, valley gutters and drive-ways shall conform accurately to the form and dimension shown on the plans and the Standard Detail drawings of the City of Santa Cruz. They shall be placed in the locations and at the grades shown on the drawings. Within the City of Santa Cruz Right-Of-Way, all forms shall be inspected by the City Engineer or his/her duly authorized representative and approval shall be obtained before placing concrete. Inspection shall continue through the pouring and finishing proves. Any work done without prior approval of the City Engineer or his/her representative shall be subject to rejection for that reason. No construction shall commence until construction drawings have been signed by the City Engineer.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- B. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for construction activities.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Per Division 3 Section "Concrete Formwork."
- B. Base for concrete walks & pedestrian slabs shall be 3/4 inch clean crushed rock, depth shown on plans.

2.02 REINFORCEMENT

- A. Per Division 3 Section "Concrete Reinforcement."

2.03 CONCRETE MATERIALS

- A. Per Division 3 Section "Cast-in-Place Concrete," normal weight aggregates.
- B. Within the City of Santa Cruz Right-Of-Way materials shall conform to the following:
 - 1. Portland Cement Concrete: Portland Cement concrete shall conform to requirements of Class "A" concrete mixed and placed as provided in the State Standard Specifications with the modifications specified below. Concrete shall have a maximum size aggregate of 1-1/2 inches. Should the quantity of ingredients designated to produce a cubic yard of finished concrete result in a yield greater than one cubic yard, the relative proportion of fine and coarse aggregate shall be changed as necessary to maintain constant the quantity of Portland Cement in each cubic yard of concrete.
 - a. All concrete within the City Right-Of-Way shall contain not less than 564 pounds of Portland Cement per cubic yard of concrete.
 - b. Where transit mixers are used, the mixing period shall be continuous from the time the water is introduced, but in no case less than 3 minutes. The revolving drum on transit mixers shall rotate at not less than 14 or more than 18 revolutions per minute to produce peripheral speed of approximately 200 feet per minute. Where transit mixers are used, adequate provision must be made for preventing delays in delivery and placing concrete. A delay of more than 60 minutes between the time water is introduced into the mix and the time concrete is placed in the forms will be considered reasonable cause for rejection of the work. Concrete so placed shall be removed from the form and disposed of by the Contractor.
 - c. The amount of water required for the proper consistency of concrete shall be determined by the slump test ASTM Serial Designation D138-32T. Maximum slump of the concrete shall not exceed 4 inches. The determination of the amount of water to be added and regulation of the water control equipment shall be under the supervision of the City Engineer. The intent of this requirement is to place the control of the mixing water solely under the control of the City Engineer or his/her representative. No changes in water shall be made without the full knowledge of the City Engineer or his/her representative.
 - d. The Contractor shall furnish without charge such materials and equipment as may be required for testing the concrete during process of the work.
 - 2. Expansion Joint Material: Expansion joint material shall be asphalt-fiber not less than 3/8-inch thick precut to conform accurately to the finished concrete section and subject to the approval of the City Engineer. Joints shall be spaced as defined by City Standards.
 - 3. Reinforcing Steel: Reinforcing rods and wire mesh, when called for on the plans or standard details, shall conform to the requirements for reinforcing steel in the State Standard Specifications.

2.04 CONCRETE MIX - BY PERFORMANCE CRITERIA

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301.

- C. Provide concrete to the following criteria:
 - 1. Compressive Strength: 2500 psi @ 28 days for site concrete other than retaining walls.
 - 2. Maximum Water/Cement Ratio: 0.5.
- D. Do not use calcium chloride.
- E. Use set retarding admixtures during hot weather only when approved by Owner's Representative.

2.05 JOINT SEALANT

- A. Expansion joints shall be bituminous fiberboard with joint sealant per Division 7 Section "Joint Sealers."

2.06 SOURCE QUALITY CONTROL AND TESTS

- A. Submit proposed mix design of each class of concrete per Division 1 Section "Submittals," to appointed firm for review prior to commencement of work.
- B. Tests on cement and aggregates will be performed to ensure conformance with specified requirements. See Division 3 Section "Cast-in-Place Concrete," for tests.
- C. Test samples in accordance with ACI 301.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade, granular base, and stabilized soil is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 PREPARATION

- A. Where the plans provide for reconstruction of existing curb and sidewalk, and the limit of new work specified does not fall on a scoring line, the entire section shall be removed and the new curb and sidewalk shall join the old curb and sidewalk at the first scoring line beyond said specified limit.
- B. Catch Basins: Materials and construction of catch basins shall be as specified elsewhere. Sections of vertical curb must be placed adjacent to the catch basins in conformity with standard details. It is preferable to leave out a section of curb and gutter to accommodate the catch basin and place this section after construction of the catch basin. The flow line of the gutter shall be depressed 2-inches of the catch basin. The depression shall begin eight feet from the catch basin to form a long transition.
- C. Sub-Grade Preparation: The sub grade shall be constructed true to grade and cross section, as shown on the plans or as directed by the Engineer and, in the case of work within the City Right-Of-Way, by the City Engineer. It shall be thoroughly watered and rolled or hand tamped until hard and solid. Not more than ¾-inch thickness of

loose soil may be filled on top of undisturbed soil. Sand or sandy gravel must be used for fills thicker than 3/4 inch. Soft or spongy material shall be removed, and all adobe material shall be excavated two inches below sub grade elevation and in both cases, the resulting space shall be filled with sand or sandy gravel approved by the Engineer, or in the case of work within the City Right-Of-Way, by the City Engineer. The fill material shall be watered thoroughly and rolled or tamped until firm and solid.

- D. The completed sub grade shall be tested for grade and cross section by means of a template extending the full depth of the sidewalk of gutter and supported between side forms. The sub grade shall be inspected and approved by the Engineer, or in the case of work within the City Right-Of-Way, by the City Engineer or his/her representative, prior to placing concrete. The sub grade and forms shall be thoroughly watered in advance of placing concrete.
- E. Moisten base to minimize absorption of water from fresh concrete, as directed by Owner's Representative.
- F. Coat surfaces of manhole and catch basin frames with bond breaker as necessary to prevent bond with concrete pavement.
- G. Notify Owner's Representative, minimum 48 hours prior to commencement of placing concrete.

3.03 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.
- D. For Work Within the City Right-Of-Way:
 - 1. Adjacent curb, gutter, and sidewalks may be placed separately or as one unit (monolithically). However, if the Contractor does not show that they are competent to finish the monolithic unit to proper form and grade, The City Engineer may require that the gutter and sidewalk be placed separately. If placed separately, the back edge of the curb shall be formed so as to provide a keyway or #4 rebar dowels at 4-feet on center to prevent settlement of the sidewalk. Said keyway shall be approved by the City Engineer or his/her representative prior to placing concrete. The depth of forms may conform to nominal finished lumber widths; however, the concrete thickness must be the full dimension shown on the details. Therefore, some excavation may be required below the bottom of form lumber to provide the full concrete thickness. Lumber used for forms must be surfaced on the side placed next to the concrete and shall be a true smooth upper edge. Form lumber shall not be less than 1-5/8 inches thick after being surfaced. Warped forms and forms not having a smooth, straight upper edge shall not be used. Bender or thick planks, rigidly placed, may be used on curves, grade changes or for curb returns.
 - 2. All forms must be carefully set to proper alignment and grade and shall be rigidly held in place by the use of steel or wooden stakes not more than 5-feet apart. Clamps, spreaders and braces shall be used where required to insure rigidity in the

- forms.
3. The forms on the face of vertical curbs shall not be removed in less than two hours nor more than six hours after the concrete has been placed. All forms shall remain in place for 12-hours after the concrete is placed. All forms shall be cleaned thoroughly each time they are used and coated with a light oil as often as necessary to prevent the concrete form adhering to them.
 4. Reinforcing Steel: Reinforcing rods and wire mesh, when called for on the plans or standard details, shall conform to the requirements for reinforcing steel in the State Standard Specifications.

3.04 REINFORCEMENT

- A. Place reinforcement as indicated. Reinforcement to be supported by dobies or bar chairs to maintain position in slab. Dobies are to be of concrete. Rocks or other salvaged material will not be accepted.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels and reinforcement to achieve pavement and curb alignment as detailed.
- D. Provide smooth dowels 18 inches on center at transverse expansion joints with one end of dowel set in capped sleeve to allow longitudinal movement.

3.05 PLACING CONCRETE

- A. Place concrete as specified in Division 3 Section "Cast-in-Place Concrete."
- B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur without prior written approval.
- D. Place concrete to pattern indicated on plans.
- E. Concrete shall be placed in such a manner as to prevent separation of large aggregate or the formation of rock pockets. It shall be spaded and tamped or vibrated until thoroughly compacted. At the end of each day's run, or is for any reason, work would be terminated, the joint shall be vertical and square-ended and come to the point of an expansion joint. Should a delay of more than 30 minutes occur between batches, the new concrete shall be worked into the old to assure a uniform joint.
- F. Small openings in existing concrete surfaces must be made by using a concrete saw to create a square and uniform edge. The portions of concrete replaced must be finished to conform to existing surfaces.
- G. In constructing curb, entrances shall be provided for driveways to replace former facilities or provide access for further driveways. The vertical curbs shall be depressed to one inch above the gutter flow line.
- H. Particular care must be taken to assure final cross section conforming to the standard details. Due to flat grades allowed, all slopes must be checked before final finishing by flowing water. The Engineer, and for work within the City Right-of-Way, the City

Engineer or his/her representative, must be present during the flowing water test. Any high spots or depressions revealed by the flowing water test must be corrected during finishing to prevent standing water on the finished section.

- I. No concrete shall be placed or finished in the rain. It shall be the Contractor's responsibility to schedule operations so that concrete will not be placed or finished in the rain.

3.06 JOINTS

- A. Place crack control joints as shown on plans or at 12-foot maximum intervals and at all re-entrant corners. Align curb, gutter, and sidewalk joints. Place joints so no slab has a length to width ratio greater than 2:1. Within four feet of slab edge or existing joint, replace to edge of slab.
- B. Place joint filler between paving components and building or other appurtenances.
- C. Provide sawn or tooled crack control joints at 12 feet intervals between sidewalks and curbs, between curbs or curb and gutter pan and pavement. Sawcut shall be 1/3 slab depth.
- D. Provide keyed joints as indicated.
- E. Expansion Joints: An expansion joint shall be placed at the end of rounded corners and approximately every forty feet there from for curb, gutter, and sidewalk. Joints in sidewalk adjacent to curbing shall fall opposite those in the curbing. Expansion joints shall be placed at right angles to the direction of the street. Expansion joints shall not be paced in driveways. Score marks and weakened planes shall be provided at ten-foot intervals between expansion joints.

3.07 FINISHING

- A. "Remove and Replace "Sidewalk Paving: Match existing finish.
- B. New Sidewalk Paving: Light broom.
- C. Curbs and Gutters: Light broom.
- D. Direction of Texturing: Transverse to pavement direction.
- E. Accessible curb ramps: As detailed.
- F. All surfaces shall be finished with a steel trowel in a manner satisfactory to the City Engineer. The surface so produced shall be sufficiently uniform and smooth so as to not produce more than 1/4 inch deviation from a ten foot straight edge place on the surface.

3.08 JOINT SEALING

- A. See Division 7 Section "Joint Sealants."

3.09 TOLERANCES

- A. See Division 1 Section "Quality Requirements."

- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet with positive drainage, and no birdbaths.
- C. Maximum Variation From True Position: 1/4 inch, maintaining required clearances and joint widths at all adjacent materials.

3.10 FIELD QUALITY CONTROL

- A. Division 1 Section "Quality Control."
- B. Division 3 Section "Cast-in-Place Concrete."

3.11 CURING

- A. After the concrete is finished, a curing compound shall be applied to all exposed surfaces. The curing material shall be subject to the approval of the Engineer and, in the case of work within the City Right-Of-Way, by the City Engineer.
- B. Cure concrete by ponding or continuously sprinkling, per ACI 301, 12.2.1, or by curing compound as specified in Division 3 Section "Cast-in-Place Concrete."
- C. Do not permit pedestrian or vehicular traffic over pavement for seven days minimum after finishing, or until 75 percent design strength of concrete has been achieved, whichever occurs first.

3.12 CLEAN-UP

- A. All forms shall be removed after the specified period of curing. Backfill materials shall be placed sufficient to protect the concrete from being undermined or washed out during winter storms. Broken or spilled concrete must be removed and disposed of and the site left in a neat and orderly condition. Broken sections of concrete must be replaced by removing the existing concrete back to score marks and replacing an entire section.

END OF SECTION 02750

SECTION 02763

PAVEMENT MARKINGS AND STRIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 2 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Pavement striping and markings for standard parking spaces.
 - 2. Pavement striping and markings for accessible parking spaces.
 - 3. Pavement striping and markings for bus parking spaces.
 - 4. Pavement striping and markings for walkways.
 - 5. Pavement striping and markings for passenger loading/unloading zone
 - 6. Replacement of pavement striping and markings removed during construction.
- B. Related Sections include the following:
 - 1. Division 2 Section "Flexible Pavement."
 - 2. Division 2 Section "Rigid Pavement."
 - 3. Division 2 Section "Signage."
 - 4. Division 10 Section "Exterior Signage."

1.03 REFERENCES

- A. California Building Code, 1998 Section 1129B, "Accessible Parking Required".
- B. Caltrans Standard Specifications, 2002 Edition, Section 84, "Traffic Stripes and Pavement Markings."
- C. Monterey Bay Unified Air Pollution Control District, 1996 Rule 426, "Architectural Coatings".

1.04 MEASUREMENT AND PAYMENT

- A. The measurement and payment section of Caltrans Standard Specifications, 2002 Edition, Section 84, "Traffic Stripes and Pavement Markings," shall apply.

1.05 SUBMITTALS

- A. None required.

1.06 QUALITY ASSURANCE

- A. Comply with applicable portion of Section 84, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications, Edition 2002, and all other governing codes and regulations.
- B. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced workers skilled in this type of work.
- C. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PART 2 PRODUCTS

2.01 MATERIALS

- A. Traffic paint shall be quick-drying chlorinated rubber alkyd type, color as follows:
 - 1. Standard parking spaces, no parking areas, directional arrows, walkways: white.
 - 2. Accessible parking spaces, accessible loading/unloading zone: blue.
 - 3. Centerline stripe: yellow.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify marking locations as shown on plans and details.
- B. Insure marking surface is clean and free of debris and that no future work as shown on plans and details will disturb marking surface.

3.02 INSTALLATION

- A. Provide 4-inch paint lines in uniform straight lines, unless noted otherwise in plans and details.
- B. Install materials and systems in accordance with manufacturer's instructions. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

3.03 FIELD QUALITY CONTROL

- A. Restore damaged finishes and test for proper operation.
- B. Clean and protect work from damage.

END OF SECTION 02763

SECTION 02810

AUTOMATIC IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes But Is Not Limited To:

1. Trenching, stockpiling excavation materials; refilling and compaction of trenches.
2. Automatic irrigation system:
 - a. Sleeving
 - b. Backflow device
 - c. Piping
 - d. Valves
 - e. Fittings
 - f. Sprinkler heads
 - g. Automatic controller
3. High voltage wiring and connections.
4. Low voltage control wiring and connections.

1.03 REFERENCES

- A. Cited Standards - current edition:

1. ASTM: American Society for Testing Materials:
 - a. A-120 Standard specifications for pipe, steel, black and hot-dipped zinc coated (galvanized) welded and seamless, for ordinary uses.
 - b. D-883 Standard definitions of terms relating to plastics.
 - c. D-1600 Standard abbreviations of terms relating to plastics.
 - d. D-1784 Standard specifications for rigid polyvinyl chloride (PVC) compounds and chlorinated polyvinyl chloride (CPVC) compounds.
 - e. D-1785 Standard specifications for polyvinyl chloride (PVC) plastic pipe, Schedules 40, 80, and 120.
 - f. D-2241 Standard specifications for polyvinyl chloride (PVC) plastic pipe (SDR-PR).
 - g. D-2464 Standard specifications for threaded polyvinyl chloride (PVC) Schedule 80.
 - h. D-2466 Standard specifications for polyvinyl chloride (PVC) plastic pipe fittings, Schedule 40.
 - i. D-2467 Standard specifications for socket-type polyvinyl chloride (PVC) plastic pipe fittings, Schedule 40.
 - j. D-2564 Standard specifications for solvents for polyvinyl chloride (PVC) plastic pipe and fittings.
 - k. D-2672 Standard specifications for bell-end polyvinyl chloride (PVC) pipe.

- l. D-2774 Standard recommended practice for underground installation of thermoplastic pressure pipe.
- m. D-2855 Standard practice for making solvent cemented joints with polyvinyl chloride (PVC) pipe and fittings.
- n. D-3036 Standard specifications for socket-type polyvinyl chloride (PVC) plastic line couplings.
- o. D-3139 Standard specifications for joints for plastic pressure pipes using flexible elastomeric seals.

1.04 RELATED WORK SPECIFIED UNDER OTHER SECTIONS:

- A. Electrical 120 VAC high voltage service connection to existing electrical utilities, conduit, wire, and pull boxes for electrical service to irrigation controller.
- B. Landscape Drawings

1.05 REGULATORY REQUIREMENTS

- A. Work and materials shall be in full accordance with the latest rules and regulations of the National Electric Code; the Uniform Plumbing Code as adopted by the International Association of Plumbing and Mechanical Officials, current edition.

1.06 SUPERVISION

- A. Supervise the work constantly through an authorized representative, and keep the same supervisor on the job from commencement to completion.
- B. Provide a supervisor who is fully knowledgeable about the Project, at the site during installation to interface with the Owner.

1.07 INSTRUCTION

- A. After the system has been approved by Owner, instruct the Owner's personnel about the complete operation and maintenance of the irrigation system. Provide a minimum of eight (8) hours of instruction.

1.08 MATERIAL SUBMITTALS

- A. Product Data: Provide manufacturer's current printed specifications and catalog cuts of the following:
 1. Backflow assembly
 2. Backflow enclosure
 3. Pipe, sleeving, and fittings
 4. Controller
 5. Gate and/or ball valve
 6. Spray head
 7. Rotor head
 8. Bubbler
 9. Remote control valve
 10. Quick coupling valve
 11. Valve box
 12. Swing joint riser
 13. Low voltage wire

14. Wire splice assembly
15. Valve identification tags
16. Solvent cement
17. Primer

1.09 CONTROLLER CHARTS

- A. Obtain Owner's approval of the Record Drawings before charts are prepared.
- B. Provide two charts for each controller installed, showing the area covered by the controller. The charts are to be as follows:
 1. Size: 8 1/2 by 11 inch.
 2. Easily readable reduced drawing of the installed system.
 3. Blackline print with a light color-highlighting marker used to show area of coverage for each station. Use a different highlighter color for each station.
 4. Hermetically seal chart between two pieces of plastic, each piece being minimum 20 mils. thick.
- C. Complete the chart and obtain approval from Owner prior to final inspection of the irrigation system.

1.10 OPERATIONAL AND MAINTENANCE MANUALS

- A. Provide six (6) manuals which are professionally bound or o-ring binder enclosed and include copies of the Contractor's name and address, detail drawings of installed equipment which vary from the construction documents, warranty information, names, address and phone numbers of manufacturer's, names, address and phone numbers of local supplier who provided the equipment, and complete operating and maintenance instructions for all components, include exploded views of each device where available.

1.11 CLOSE OUT SUBMITTALS

- A. Maintain one complete set of blue line prints of irrigation Drawings in the field office.
- B. Record accurately on one set of blue line prints of the irrigation Drawings, variances of the work from the original Drawings, including changes in both pressure and non-pressure piping.
- C. Upon completion of each increment of work, transfer information and dimensions to the prints. Record the changes and dimensions in a legible and professional manner. When the Drawings are approved, transfer information to a set of reproducible Drawings supplied by the Owner.
- D. Dimension from two permanent points of reference (building corners, monuments, sidewalks, curbs, pavement, lightposts, or fire hydrants) the locations of the following noted items. Show locations on Record Drawings and record daily as the Project is being installed. Dimensions noted on Drawings shall be 1/4 inch in size.
- E. Show locations and depths of the following items:
 1. Point of connection

2. Routing of pressure main line piping (dimension maximum 100 feet along routing)
 3. Gate valves
 4. Sprinkler control valves
 5. Quick coupling valves (new and existing)
 6. Routing of low voltage wire and communication wire (dimension maximum 100 feet along routing)
 7. Controller
- F. Other related equipment as directed by the Owner.
- G. Complete the following checklist at the end of the Project, using the format shown:
1. Plumbing permits (if none are required, so note)
 2. Material approvals (approved by and date)
 3. Pressure main line pipe tests (by whom and date)
 4. Record Drawings completed (received by and date)
 5. Controller charts completed (received by and date)
 6. Materials furnished (received by and date)
 7. Operation and maintenance manuals furnished (received by and date)
 8. System equipment operation instructions (received by and date; total hours of instruction given)
 9. Manufacturer warranties, if required (received by and date)
 10. Written Guarantee (received by and date)
- H. Signed and dated checklist must be forwarded to Owner before final acceptance of the Project.
- I. Supply new equipment for defective equipment supplied for this Project during the stated warranty period, at no additional expense to the Owner.
- J. Include a 1-year replacement guarantee on the equipment. Return to manufacturer equipment determined to be defective for a full replacement for a 1-year period, beginning when the Owner accepts the irrigation system.
- K. Provide written documentation that the subcontractor or supplier furnishing products herein has been installing products specified herein are in the landscape and irrigation industry, operating under its current business name for a minimum of five (5) years.

PART 2 - MATERIALS

2.01 CONTROLLER

- A. Manufacturer: As listed on the Drawings.

2.02 MAIN LINE PIPE

- A. Manufacturer: PW Pipe, J-M pipe, or equal.
- B. Pipe: 1120-schedule 40 PVC pipe with solvent welded joints.
- C. Pipe joints: schedule 40 PVC fittings.

2.03 LATERAL LINE PIPE

- A. Manufacturer: PW Pipe, J-M pipe, or equal.
- B. Pipe: 1120-schedule 40 PVC pipe with solvent welded joints.
- C. Pipe joints: schedule 40 PVC fittings.

2.04 FITTINGS FOR PVC PIPE

- A. Manufacturer: Lasco, Dura, or equal.
- B. Material: Polyvinyl chloride (PVC) plastic in conformance with ASTM D-1784 (cell classification 12454-B).
- C. Schedule: 40 or 80, refer to the Drawings for application.

2.05 SLEEVING

- A. PVC class 200 pipe.

2.06 BALL VALVE

- A. Manufacturer: Nibco, or approved equal.
- B. Components: Class 125 bronze, full port, female, I.P.S. threaded connections.
- C. Standard direction of opening (counterclockwise to open).

2.07 REMOTE CONTROL VALVE

- A. Manufacturer: Rain Bird or approved equal.
- B. Solenoid control valve consisting of a main valve and a solenoid control pilot.
- C. Components:
 - 1. Plastic body.
 - 2. Manual on-off bleed screw.

2.08 QUICK COUPLING VALVE AND KEY

- A. Manufacturer: Rain Bird as listed on the drawings.
- B. Components:
 - 1. Bronze construction with female I.P.T. threaded connections.
 - 2. Valve body: Two piece construction
 - 3. Cover: Bronze with thermoplastic rubber cover marked "Do Not Drink" in English and Spanish language.
 - 4. Quick coupling valve key to be of the same manufacturer as the QCV.

2.09 VALVE BOXES

- A. Manufacturer: Brooks Plastics, Inc., Applied Engineering Products, or equal.
- B. Material: Structural foam with polyester resins and ultraviolet inhibitors.
- C. Remote Control Valve Boxes: 11-3/4 inch by 17 inch by 12 inch deep. Color: Green. Lid: Bolt lockable "T" cover type, marked "IRRIGATION".
- D. Gate Valve Boxes: 10 inch diameter dia. by 10-1/4 inch deep. Color: Green. Lid: Bolt lockable "T" cover type, marked "IRRIGATION" for irrigation valves or "WATER" for potable water valves.
- E. Low Voltage Pull/Splice Boxes: 10 inch diameter by 10-1/4 inch deep. Color: Green. Lid: Bolt lockable T cover type, marked "IRRIGATION".

2.10 POP-UP SPRAY SPRINKLERS (4-15 FOOT RANGE)

- A. Manufacturer: Rain Bird with fixed arc and variable arc nozzles.

2.11 SWING JOINT RISER

- A. Manufacturer: Lasco, Dura, Rain Bird or equal.
- B. Material: PVC

2.12 LOW VOLTAGE WIRE FOR SOLENOID CONTROLLED VALVES

- A. Manufacturer: Paige Electric, Regency, or equal.
- B. Attributes:
 - 1. Soft-annealed, uncoated copper.
 - 2. Single conductor, with PVC insulating jacket, 600 volt rated UL listed Type UF for direct burial in soil.
 - 3. Common ground wire to have a white insulating jacket with a colored strip along the jacket which matches the controller's control wire color.
 - 4. Control wire to have an insulating jacket color other than white and each set of control wires at a satellite to have an insulating jacket color different from adjacent satellite control wires.
 - 5. Spare wire to have an insulating jacket color other than white or the color of the control wires.
 - 6. Control wires and spare wires: #14-1 AWG
 - 7. Common wires: #14-1 AWG.

2.13 WIRE SPLICE ASSEMBLY

- A. Manufacturer: 3M Co. 3M-DBY splice kit, Paige Electric DBM-L, or equal.
- B. Attributes:
 - 1. Direct bury splice kit with a Y electrical spring connector.
 - 2. Voltage rating: 30 volts maximum.

2.14 VALVE IDENTIFICATION TAGS

- A. Manufacturer: T. Christy Enterprises ID-STD-Y1-alpha-numeric sequence, or equal (no known equal).
- B. Material: yellow colored polyurethane behrdesopan (flexible plastic).
- C. Black alpha-numeric lettering on one side.

2.15 MISCELLANEOUS INSTALLATION MATERIALS

- A. Solvent cement, cleaner, and primer: IPS Weld-On, Oatey, or equal.
- B. Pipe joint compound: Rectorseal T Plus 2, Permatex, or equal. A non-hardening, non-toxic material designed specifically for use on metallic and plastic (PVC) threaded connections in water carrying pipe.

2.16 MAINTENANCE

- A. Extra materials: Provide the following:
 - 1. Ten sprinkler heads of each size and type.
 - 2. Two valve keys for operating manual gate valves.
 - 3. Four wrenches for adjusting, removing, and installing each type of head.
 - 4. Four quick coupler keys and hose swivels.

PART 3 - INSTALLATION

3.01 CONSTRUCTION OF SYSTEM

- A. Construct the irrigation system to the sizes, grades, and locations shown on the Drawings. Pipe routing shown on the Drawings is diagrammatic. Establish the locations of sprinkler heads, etc. at the time of construction. Spacing of the sprinkler heads is shown on the Drawings and the maximum spacing (head to head) is indicated in the irrigation legend on the Drawings. Exceed spacing only with the approval of the Owner.

3.02 FIELD QUALITY CONTROL

- A. Progress observations: In addition to the observations specified below, the Owner will make periodic progress observations.
- B. Notify the Owner in advance of the following observation meetings:
 - 1. Field layout: 7 day notice.
 - 2. Pressure supply line installation and testing: 48 hour notice.
 - 3. Controller installation: 48 hour notice.
 - 4. Coverage test: 48 hour notice
 - 5. Maintenance period observations: 7 day notice.
 - 6. Final observation: 7 day notice.

- C. The Owner will not allow review if a site visit is scheduled without specified Record Drawings, without completing previously noted corrections, or without preparing the system for review.

3.03 COORDINATION

- A. Inspect, become familiar with, and protect existing utilities.
- B. Coordinate placement of items to be embedded into concrete Work.
- C. Verify static pressure at point of connection before starting construction and notify the Owner if it is less than or greater than the static PSI stated on the Drawings. Verify static pressure before start of work.

3.04 HANDLING AND STORAGE

- A. Protect Work and materials from damage during construction and storage.
- B. Handle plastic pipe carefully; especially protect it from prolonged exposure to sunlight.

3.05 LAYOUT

- A. Before installation, stake layout of pressure main line pipes, valves, and sprinklers for approval by the Owner. Coordinate with existing layout of utilities, monuments, and trees. Adjust as directed by the Owner.
- B. Drawings are diagrammatic. Provide necessary fittings and offsets to adapt to existing conditions and prevent conflicts with other Work and existing improvements. Keep 90 degree elbow fittings to a minimum in pressure main line pipe - use 45-degree fittings to keep water flow in a minimum turbulence condition.
- C. Minimum pipe clearance:
 - 1. Irrigation system pipes: 3 inches
 - 2. Irrigation pipes to other utilities:
 - a. Electrical wires or conduit: 4 feet minimum horizontal clearance, 6 inch minimum vertical clearance
 - b. Sanitary sewers: 10 feet minimum horizontal clearance, 6 inch minimum vertical clearance
 - c. Storm drains, telephone conduits, and other utilities: 4 feet minimum horizontal clearance, 6 inch minimum vertical clearance.
 - d. Pipes crossing at angles between 45 and 90 degrees: 2 inch vertical clearance.
- D. Do not install pipe parallel to and directly over another irrigation or utility line without approved separation.
- E. Install pipes and low voltage wiring in common trenches wherever practical.

3.06 EXCAVATION AND TRENCHING

- A. Excavate trenches with ample space to permit the pipes to be laid at the elevations intended and to permit ample space for joining.
- B. Dig trenches straight and support pipe continuously on bottom of trench. Keep trenches 18 inches away from paving. Lay pipe to even grade.
- C. Provide minimum cover from finish grade as follows:
 - 1. 18-inch minimum cover over main line pipe.
 - 2. 18-inch minimum cover over low voltage wires.
 - 3. 12-inch minimum cover over lateral line pipe to sprinkler heads.
- D. PVC pipe is flexible and can be curved longitudinally without affecting performance. Therefore lateral line pipe trenches may be curved to meet the following allowable longitudinal minimum bending radius for 20 foot pipe lengths.

Allowable minimum pipe bending radius:	
Pipe Diameter	Bend Radius
3/4 inch	15 feet - 0 inches
1 inch	9 feet - 0 inches
1-1/4 inch	32 feet - 0 inches
1-1/2 inch	32 feet - 0 inches
2 inch	40 feet - 0 inches
2-1/2 inch	48 feet - 0 inches

- E. Restore surfaces and existing underground utilities, damaged or cut as a result of excavations, to original conditions. Obtain approval from the Owner.
- F. Where other utilities interfere with irrigation trenching and pipe work, adjust the trench depth as instructed by the Owner.

3.07 SLEEVES

- A. Install minimum 12 inches below bottom of pavement base, and at least as deep as required depth of pipe.
- B. Backfill and compact according to this specification under "Backfilling".
- C. Sleeve internal diameter is to be minimum twice the outside diameter for all pipes contained within sleeve and extend minimum 24 inches beyond edge of pavement. In-line fittings are not permitted in sleeves less than 20 feet long. Provide wooden caps at ends of sleeves until pipe is installed.
- D. Install extra 2-inch sleeve parallel to each sleeve and cap each end. Show locations on Record Drawings.
- E. Install sleeves level and in straight line.
- F. Backfill with 4 inches of clean sand around circumference of sleeve, and compact by tamping.

3.08 PIPE ASSEMBLY

- A. Install piping under existing concrete by jacking or boring. Where cutting or breaking of existing paved asphalt surface is necessary, remove the pavement, install the pipe or conduit, backfill and compact to original specifications. Restore paving as specified in Section 01540 and as approved by the Owner.
- B. Install pipe in a dry trench and provide for expansion and contraction as described by the manufacturer of the pipe.
- C. Cut plastic pipe with a pipe cutter or hack saw with the assistance of a squared-in sawing vice, or in a manner to ensure a square cut. Remove burrs at cut ends prior to installation to obtain a smooth unobstructed flow.
- D. Use PVC pipe cleaner and primer on solvent weld PVC pipe before PVC solvent cement is applied.
- E. Install piping in trench with manufacturer's markings (manufacturer, pipe size, Schedule or Class, pressure rating, etc.) facing up and readable to Owner during installation.
- F. Pipe Jointing: Jointing shall be in conformance with the pipe manufacturer's installation instructions.
- G. Joint Deflection for solvent welded pipe: Special care shall be taken to not have joint deflection while solvent welding pipe into socket fittings.
- H. Paint below grade galvanized iron pipe and fittings with two coats of a corrosion preventative coating which is a composition of a coal tar base pitch, fast evaporating solvents and selected fillers.
- I. Solvent weld joints:
 - 1. Instruct each pipe installer in the proper assembly of solvent joints from a representative of either the pipe, cement or fitting manufacturer before starting a job, unless the installer has been previously instructed in the recommended solvent cement procedures.
 - 2. Prepare joint by first making sure the pipe end is square, then deburring the pipe end and cleaning pipe and fitting of dirt, dust and moisture with PVC pipe cleaner.
 - 3. Dry-insert pipe into fitting to check for proper insertion depth. Pipe should enter fitting 1/3 to 2/3 depth of socket.
 - 4. Coat the inside socket surface of the fitting and the external surface of the male end of the pipe with primer. Apply cement liberally to the male end of the pipe and apply cement lightly to the inside of the socket. Apply a second coat of cement to the pipe end.
 - 5. Insert pipe immediately into fitting and turn 1/4 turn to distribute cement and remove air bubbles. The pipe must seat to the bottom of the socket and fitting. Check alignment of the fitting. Align pipe and fitting properly without strain to either.
 - 6. Hold joint still for approximately thirty (30) seconds and wipe the excess cement from the pipe and fitting.
 - 7. Cure joint a minimum of thirty (30) minutes before handling and at least six (6) hours before allowing water in the pipe.

J. Threaded Joint:

1. Field threading of plastic pipe or fittings is not permitted. Factory-made threads is the permitted method.
2. Use factory-made metallic nipples whenever possible. Field-cut threads in metallic pipe will be permitted where absolutely necessary. Cut threads accurately on axis with sharp dies.
3. Install threaded joints with pipe joint compound. Apply compound to male threads and first two female threads.
4. Where assembling metallic pipe to metallic fitting or valve, expose no more than three (3) full threads when joint is finished.
5. Where assembling threaded plastic fittings, take up joint no more than one full turn beyond hand tight.
6. Where assembling soft metal (brass or copper) or plastic pipe, use strap type friction wrench; do not use metal-jawed wrench.

K. Cap open pipe ends as pipe is assembled to prevent entrance of dirt or obstruction. Remove caps only when necessary to continue assembly.

L. Where pipes or control wires pass through sleeves, provide removable non-decaying plug material at ends of sleeve to prevent entrance of soil.

3.09 REMOTE CONTROL VALVE

- A. Provide excavation and backfill, furnishing, installing and testing of risers, fittings, and valve, and other Work in accordance with the Drawings and Specifications.
- B. Install where shown on Drawings, group together where practical and in landscape areas. Limit one remote control valve per box. - No Exceptions.
- C. Thoroughly flush main line pipe before installing valves.
- D. Label each valve with a identification tag, indicating identification number of valve (controller and station number). Permanently attach label to solenoid control wire.
- E. Provide each remote control valve with its own threaded riser and connection to main line pipe. Do not manifold valves to a single riser from main line.

3.10 LOW VOLTAGE WIRING

- A. Install wiring alongside main line piping wherever practical.
- B. Tie wires in bundles with pipe wrapping tape at 10-foot intervals and allow slack for contraction between strappings.
- C. Loop a minimum of 3 feet of extra wire in a 1-inch diameter coil at each splice.
- D. Make connections to wiring by twisting bare wires, securing with wire connectors and sealing with weatherproof wire splice assembly as shown on Drawings.
- E. Splicing of valve control wire other than at valve or satellite controller is permitted only on runs exceeding 2500 feet. For this condition, locate splices within a separate 10 inch diameter valve box.

- F. Where low voltage wires pass under pedestrian paving, install wire through Schedule 40 electrical conduit.
- G. Install the wire in a logical manner, avoiding existing shrubs, trees, light posts, monuments, and signs.

3.11 BALL VALVE

- A. Provide excavation and backfill, the furnishing and installing of fittings and valve, and other work in accordance with the Drawings and Specifications.
- B. Set the valve box flush with finish grade unless otherwise designated on the Drawings.
- C. Thoroughly flush pipe before installing valve.
- D. Locate and install as shown on the Drawings and details.
- E. Unless otherwise noted on the Drawings, place the valve in the open position when system is finished.

3.12 QUICK COUPLING VALVE

- A. Provide excavation and backfill, the furnishing, installing, testing of risers, fittings, and valve, and other work in accordance with the Drawings and Specifications.
- B. Set the valve perpendicular to the finish grade unless otherwise designated on the Drawings.
- C. Thoroughly flush lines before installing valve.
- D. Locate and install as shown on the Drawings and details.

3.13 VALVE BOX INSTALLATION

- A. Do not saw cut the plastic valve boxes for any reason.
- B. Rectangular Valve Boxes:
 - 1. Locate valve boxes 12 inches from and perpendicular to walk edges, buildings, and walls. Provide 12 inches between valve boxes where valves are grouped together.
 - 2. Install four common bricks (one at each corner of box) under base of box for support.
 - 3. Install 3/8 inch diameter pea gravel inside box for drainage.
 - 4. No soil or collection of water permitted inside box. Install 10 mil. polyethylene tape to box side cutouts and pipe where pipe exits box (where applicable).
 - 5. Indicate box locations on Record Drawings.
 - 6. Lock box lid at end of project.
- C. Round Valve or Splice Boxes:
 - 1. Locate valve boxes 12 inches from walk edges, buildings, and walls. Provide 12 inches between valve boxes where valves are grouped together.

2. Install two common bricks (one on each side) under base of box for support.
3. Install 3/8 inch diameter pea gravel inside box for drainage.
4. No soil or collection of water permitted inside box. Install 10 mil. polyethylene tape to box side cutouts and pipe where pipe exits box (where applicable).
5. Indicate box locations on Record Drawings.
6. Indicate splice box locations on Record Drawings and note which field satellite the wires originate from and the quantity of wires available.
7. Lock box lid at end of project.

3.14 SPRINKLERS

- A. Provide excavation and backfill, furnishing, installing and testing of risers, fittings, sprinkler heads, and other Work in accordance with the Drawings and Specifications.
- B. Set sprinkler heads flush with grade and perpendicular to the finish grade unless otherwise designated on the Drawings.
- C. Thoroughly flush PVC lateral line piping before installing heads.
- D. Do not use pipe joint compound on sprinkler inlet threads.
- E. Locate and install heads as shown on the Drawings and details.
- F. Adjust sprinkler heads for proper distribution and trim.

3.15 CONTROLLER

- A. Mount enclosure to the wall or a concrete base as detailed on Drawings.
- B. Install controller in approximate locations shown on Drawings. The exact location will be determined on the site by the Owner. Provide conduit and wire and connect to 120 volt switch and GFCI protected duplex receptacle accessible to satellite controller for ease of maintenance.
- C. Connect control lines to controller in sequential arrangement according to assigned identification number of valve. Label each control wire at satellite controller with a permanent non-fading label indicating station number of valve controlled. Permanently attach label to control wire.
- D. Grounding:
 1. Critical to the installation of the satellite is the connection to a grounding rod - install per the manufacturer's specifications. Do not connect to the electrical service ground, use a separate copper-clad grounding rod. Failure to ensure correct grounding may result in damage to the electronics and void the warranty.
 2. Measure the resistance to ground of the grounding circuit. Resistance must be less than 50 ohms.
 3. Connect the grounding rod to the controller with a #10 AWG bare copper wire.

3.16 HIGH VOLTAGE ELECTRICAL SERVICE

- A. Electrical service installation and materials: UL listed and conforming to the requirements of NEC, NEMA, local codes, and the Electrical Specification Division 16.

- B. Refer to the Electrical Drawings for actual points of electrical connection. Coordinate with the Owner.

3.17 BACKFILLING

- A. Do not allow the Work of this Contract to be covered or enclosed until it has been inspected, tested and approved in writing by the Owner. Should Work be enclosed or covered before inspection and test, uncover the Work at no additional expense to the Owner.
- B. Backfill material: Earth excavated from the trenches, free from rocks, concrete chunks, and other foreign or coarse materials. Select backfill that is to be placed next to plastic pipe to avoid any sharp objects that may damage the pipe.
- C. Backfill PVC plastic pipe under asphalt paving with 6 inches of clean sand on all sides of pipe unless it is contained within a sleeve.
- D. Place backfill materials in 6-inch layers and compact by jetting or tamping to a minimum compaction density equal to original soil density.
- E. Grade areas to finish grade and remove excess soil, rocks or debris remaining after backfill is completed.
- F. If settlement occurs along trenches, and adjustment of pipes, valves and sprinkler heads, soil, or paving is necessary to bring these items to the proper level or the permanent grade, provide adjustments at no additional expense to the Owner.

3.18 FLUSHING

- A. Prior to leakage testing, thoroughly flush with water to remove debris introduced into the piping during the construction operations. Open valve outlets, and continue flushing operations until clear water flows.

3.19 TESTS

- A. General. Test pipelines for leakage in accordance with the requirements specified for each type of pipe. Provide materials and labor required for the leakage test including pumps, gauges, temporary plugs, and thrust blocks. Use laboratory calibrated test gauges recalibrated by a certified laboratory at the Contractor's expense prior to the leakage test if requested by the Owner. Block off during the testing, valves and appurtenances that might be damaged by the test pressure and provide suitable thrust restraints. If the test of any section of pipe results in leakage greater than the specified allowable amount, repair the defective work and retest that section until the leakage is within the allowable amount. Water for testing will be furnished by the Owner from available sources at the site. Pay for the cost of water and perform testing at no additional expense to the Owner.
- B. Notify the Owner at least three (3) days in advance of testing.
- C. Center load piping with small amount of backfill to prevent arching or slipping under pressure. Do not cover fittings.

- D. PVC pipe (solvent weld joints) - Apply the following tests after solvent weld plastic pipe joints have cured at least 24 hours:
1. Test main line piping upstream of remote control valves with water at 120 PSI pressure for 6 hours. Visually inspect for leaks. Pressure is to remain constant during test. Retest after correcting defects.
 2. Test lateral line piping downstream of remote control valves with water at line pressure and visually inspect for leaks. Retest after correcting defects.
 3. Remake any faulty joints with new materials. Use of cement or caulking to seal leaks is absolutely prohibited.

3.20 PROTECTION OF PROPERTY

- A. The existing services and irrigation equipment indicated on the Drawings to remain operational are shown diagrammatically. Field verify the sizes, location, and proper operation of existing equipment to remain operational within and beyond the Contract Area. This includes, but is not limited to the following:
1. Sprinkler coverage at interface areas between the Contract Area and adjacent irrigation areas that are to remain operational.
 2. Utilities servicing buildings within and beyond the Contract Area.
 3. Potable (domestic) water services to buildings within and beyond the Contract Area.
- B. Notify the Owner prior to field verification of existing utilities and irrigation. Provide a report, in writing to the Owner for review and possible revision, any deviation of existing services and irrigation equipment as shown on the Drawings.
- C. Contact Underground Service Alert (U.S.A.) at (800) 642-2444 for location and marking of existing utilities prior to construction.

3.21 GUARANTEE

- A. Fill and repair depressions due to the settlement of irrigation trenches for one year following completion and acceptance of the job.
- B. Guarantee materials, equipment and workmanship furnished to be free of defects and agree to replace at no additional expense to the Owner, upon demand within one year after installation is accepted, defective components or installations that may be found.

3.22 CLEAN-UP

- A. When Work of this section has been completed and at such other times as may be directed by the Owner, remove all trash, debris, surplus materials and equipment from site.

END OF SECTION 02810

SECTION 02825

SOUND BARRIER WALL PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Sound barrier panel assemblies incorporating sound absorptive plastic block/bezel modules mounted in the steel panel frame.
 - 2. Structural support post framing.
 - 3. Gate framing with hinges, lock and header bolt.
- B. Related Sections include the following:
 - 1. Division 8 Section "Door Hardware" for lock cylinder.

1.03 SYSTEM DESCRIPTION

- A. System Design Requirements: Sound barrier panel shall be formed of plastic block/bezel module assemblies mounted in the steel panel frame and supporting rails.
 - 1. Completed panel assemblies including block/bezel assemblies, panel frame and support rail structure shall weigh no more than 10 pounds per square foot of in-place panel.
 - 2. Bezels shall function as noise traps and surround each block.
 - 3. Block/bezel components shall be symmetrical on front and back faces.
 - 4. Block/bezel Module Size:
 - a. Face Dimension: 16 inches square.
 - b. Thickness: No greater than 5 inches, face-to-face.
 - 5. Panels assemblies shall be sized to fill the span, with integral numbers of modules, between the support post and gate framing indicated on the Drawings.
 - a. Single Panel Assembly Span: Capable of spanning up to 16 feet without intermediate post.
 - 6. Support posts and gate framing shall be provided, as indicated on the Drawings, to allow for either flat, vertical, or angled supports for the panels.
 - 7. Rails of beam or channel sections shall be provided to connect panels to posts and gate framing, and to panel-to-panel modules, to provide a complete sound barrier system.

B. Performance Requirements:

1. General: Provide sound barrier panel assemblies capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to supporting structure.
 - c. Block/bezel assemblies cracking, breaking or disengaging from panel framing and railing supports.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
2. Structural Loads: Provide sound barrier panel assemblies, including anchorage, capable of withstanding the effects of the following design loads when supporting full dead loads:
 - a. Load Combinations: Design sound barrier panel assemblies to withstand the most critical effects of load factors and load combinations as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
 - b. Wind Loads: As indicated on Structural Drawings.
 - c. Wind Load Performance: Provide sound barrier panel assemblies tested by a qualified testing agency for the following
 - 1) Dynamic Loading: Equivalent to 150 mph. without any permanent structural deflection.
 - 2) Wind Loading at 60 mph: Deflection of the entire span of panel assembly in direction normal to assembly plane shall be limited to 1/240 of clear span.
3. Thermal Movement: Provide sound barrier panel assemblies that allow for thermal movement between vertical posts resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling; sealant failure; damaging deflection and other detrimental effects to the panel system.
 - a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
4. Acoustical Performance: Provide sound barrier panel assemblies tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - a. Sound Transmission Loss Requirements (STL): Sound barrier panel assembly tested for laboratory sound transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STL indicated in following table:

Freq. (Hz.)	250	500	1000	2000	4000
STL (dB)	23	23	24	36	36

- b. Noise Reduction Requirements: Sound barrier panel assembly tested for sound absorption performance according to ASTM C 423 and rated for not less than the absorption coefficient (AC) indicated in the following table:

Freq. (Hz.)	250	500	1000	2000	4000
AC	0.21	0.64	0.88	0.72	0.58

5. Visible Light Transmission: Sunlight transmission through the translucent sections of the barrier shall be not less than 80 percent when tested in accordance with ASTM D-1003 prior to application of specified coatings or tinting procedures to plastic block/bezel modules.
6. Light Reflectivity: Panel module surfaces shall be faceted to deflect glare from approaching auto headlights and sunlight to a direction that does not interfere with the vision line-of-sight of drivers on the roadway. The intensity of glare observed by drivers on the roadway shall be reduced to a level of 1/2000th of the intensity of light normally reflected from clean, polished plate glass.
7. Graffiti Resistance:
 - a. Oil based, acrylic or latex based paints shall be removable with one or both of the following:
 - 1) A 150 F deg jet of water.
 - 2) A non-abrasive, commercially available cleaning agent recommended by the Manufacturer.
 - b. For More Permanent Forms of Graffiti: Sound barrier panel modules not greater than 16 by 16 inches shall be individually replaceable by a trained person in not more than 10 minutes per module.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions, profiles, and finishes of sound barrier panel components.
- B. Shop Drawings: For sound barrier panel assemblies, include plans, elevations, sections, details, and attachments to other Work. Include the following:
 1. Small scale elevations for level grade and sloped grade installations.
 2. Large-scale details of panel-to-panel, panel-to-post, panel-to-base and panel-to-top connections and supporting rails.
 3. Large-scale details showing bolt and gasket placement and connection details.
 4. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Erection Procedures: For information only. Include the following:
 1. Written description of manufacturer's recommended sequence of job-site erection and assembly procedures.
 2. Include list of manufacturer recommended installation equipment and precautions to be taken when using equipment.

- D. Samples for Initial Selection: Manufacturer's color charts consisting of sections of units showing the full range of colors available for the following:
 - 1. Factory-finished metal panel framing.
- E. Samples for Verification: For each exposed finish required, in same thickness and material indicated for the Work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
 - 1. Panels: One block/bezel assembly including light transmitting block, noise trap bezel and metal frame.
 - 2. Panel Connection Structure: One block/bezel length set of brackets, channels and beams for connecting the panel-to-panel and the panel-to-post connections.
 - 3. Fasteners: One set of panel-to-panel and panel-to-post fasteners.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Welding certificates.
- H. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- I. Product Test Reports: From a qualified testing agency indicating that sound barrier panel assemblies comply with requirements, based on comprehensive testing of current products.
- J. Maintenance Data: For the following to include in maintenance manuals specified in Division 1:
 - 1. Panel face finishes and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing sound barrier panel assemblies similar to those indicated for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Preparation of data for sound barrier panel assemblies, including Shop Drawings, based on engineering analysis of manufacturer's standard translucent wall assemblies similar to those indicated for this Project.
- B. Manufacturer's Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

- C. Product Options: Drawings and Specifications indicate size, profiles, and dimensional requirements of sound barrier panel assemblies and are based on Basis of Design product indicated. Other manufacturers' sound barrier panel assemblies that comply with requirements may be considered. Refer to Division 1 Section "Substitutions."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. Mockups: Before installing sound barrier panel assemblies, build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting fabrication.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed.
 - a. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where sound barrier panel assemblies are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating sound barrier panel assemblies without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

- A. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of sound barrier panel assemblies that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures.
 - 2. Deterioration of metals, metal finishes, plastic block/bezel modules, and other materials beyond normal weathering.
 - 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide QUILITE International, LLC; QUILITE Noise Barrier System or comparable product by another manufacturer (no known equal).

2.02 MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, Grade 50, G90 Galvannealed coating, commercial quality.
- B. Polycarbonate Plastic: Comply with the following:
 - 1. Self Ignition Temperature: Greater than 1000 degrees F when tested in accordance with ASTM D-1929.
 - 2. Flame Spread and Smoke Generation: Class B or better when tested in accordance with ASTM E84.
 - a. Flame Spread: Not greater than 75.
 - b. Smoke Developed: Not greater than 450.
 - 3. Operating Temperatures: There shall be no significant reduction in impact load resistance between temperature range of plus 200 deg F and minus 40 deg F.
 - 4. Color: As selected by Architect.
- C. High-Performance Proprietary Plastic: Plastic formulated with polyphenylene oxide/polypropylene alloy resins, with or without fibrous glass filler.
 - 1. Resin Product: Provide General Electric Company; Noryl PPX (no known equal).
- D. Structural Post Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.03 PAINT

- A. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated; complying with SSPC-Paint 5.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.04 MANUFACTURED UNITS

- A. Light Transmitting Block: Manufactured from polycarbonate plastic with not less than

80 percent solar transmissivity.

- B. Bezel Noise Traps: Manufactured from polycarbonate.
- C. Panel Frames: Interstitial and channel frame sections shall be manufactured from galvanized steel not less than 0.0548 inch thick (16 gauge).
- D. Gaskets Sealing block/bezel assemblies in Metal Frame: EPDM Neoprene (compound 60-K-20) or Santoprene rubber equivalent which has an operating range of minus 40 deg F to plus 220 deg F.
- E. Panel-to-Panel and Panel-to-Post Support Rails: Formed beams and channels fabricated from galvanized steel not less than 0.0548 inch thick (16 gauge). Size rails to ensure compliance with the panel length to deflection ratio specified in Part 1 Article "Performance Requirements."
- F. Posts and Gate Structural Framing: Tubular steel ASTM A-500 Grade B or better, sized to meet the wind loading and seismic requirements specified in Part 1 Article "Performance Requirements," with steel base plates and caps fully welded to end of posts.
 - 1. Finish: Galvanized and painted.

2.05 HARDWARE

- A. Gate Hinges: Extra heavy duty, full service, 5-knuckle, plain steel hinges with non-removable fast-spun pins, no hole construction and non-swaged for weld-on application, 6 X 6 size.
 - 1. Available Product: Subject to compliance with the requirements provide Stanley; #850 Series.
- B. Gate Locking Hardware: Same manufacturer shall provide both deadlock and threshold bolt.
 - 1. For pair of doors provide both deadlock and threshold bolt.
 - 2. Deadlock: Suitable for mounting in hollow stile door frames and compatible with header bolt. Include machine screws for mounting.
 - a. Operation: 360 deg turn of key throws or retracts a counter-balanced bolt. Key can be removed only when bolt is in a positively locked or unlocked position. Lock shall accept building standard mortise cylinder from one side.
 - b. Nominal Case Size: Steel, 1-inch wide by 6-inches high by 1-3/4-inches deep.
 - c. Nominal Cylinder Backset: 7/8-inches.
 - d. Bolt: Five ply laminated steel, 5/8-inch wide by 1-inch min height with 1 3/8-inch min throw, designed to resist cutting by hacksaw.
 - e. Faceplate: Aluminum, flat shape, black anodized finish.
 - f. Strike Slot: By gate fabricator, cut in metal jamb of opposite leaf.
 - g. Cylinder: See Division 8 Section "Door Hardware."
 - h. Available Product: Subject to compliance with the requirements provide Adams Rite Manufacturing Co.; Deadlock Series MS1850SW.
 - 3. Header Bolt: Suitable for mounting within hollow stile door frames and

compatible with deadlock. Include bolt guide, machine screws and attachment pin for mounting.

- a. Operation: Interconnects with deadlock. As bolt is thrown or retracted in door stile strike slot, header bolt is thrown and retracted in header strike.
- b. Header Bolt: Hexagonal, 3/8-inch (flat to flat) width. Hardened steel, plated for corrosion resistance, securely attached to bolt rod.
- c. Bolt Rod: Threaded, adjustable, steel rod of length required for application.
- d. Bolt Guide: Steel unit with guide holes for bolt. Unit shall be designed to lock bolt rod to adjusted length setting.
- e. Header Strike: By gate fabricator, cut in hollow metal header.
- f. Available Product: Subject to compliance with the requirements provide Adams Rite Manufacturing Co.; Header Bolt 4016.

2.06 FABRICATION

- A. Fabricate sound barrier panel assemblies plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written instructions, and requirements in this Section.
 1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

2.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel finishes.

2.08 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.
- C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing sound barrier panel components.
 - 1. Fit panel component joints to produce joints free of burrs and distortion.
 - 2. Rigidly secure nonmovement joints.
 - 3. Accommodate thermal and mechanical movements.
- B. Erection Tolerances: Install sound barrier panel system components true in plane, accurately aligned, and without warp or rack. Adjust to comply with the following tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet; 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.

3.03 FIELD QUALITY CONTROL

- A. Sound Reduction Testing: Owner will engage a qualified testing laboratory to perform field tests and to prepare test reports.

B. Testing Methodology:

1. Testing of the installed sound barrier panel assemblies for noise reduction shall be performed to verify if system meets or exceeds acoustical performance requirement specified in Division 1 Article "System Description" and shall also be tested for correlation with the following minimum requirements for a 20-foot high barrier:
 - a. For A-rated broadband 125 Hz to 8000 Hz, penetrating the barrier (noise inside versus noise outside), measured 100 ft behind a 20 ft high barrier shall be reduced by 20 dB or greater.
 - b. Noise reduction due to penetration and reflection shall be equal for both sides of the wall.
 - c. A-rated noise reflected from a 20 ft high barrier compared with noise incident on the front of the barrier shall be reduced an average of 10 dB or greater, at a distance of approximately 100 ft in front of the barrier, for frequencies between 500 Hz and 8000 Hz.
2. Field test reports shall indicate if the system meets or exceeds minimum performance requirements base on testing procedures indicated above.

C. Testing Extent: Within each area indicated on Drawings, testing agency shall randomly select a series of sound barrier panel assemblies for testing.

D. Final Sound Barrier Panel Assemblies Inspection: Arrange for sound barrier panel system manufacturer's technical personnel to inspect panel installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

E. Repair or remove and replace components of sound barrier panel system where inspections indicate that they do not comply with specified requirements.

F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.04 PROTECTING AND CLEANING

A. Protect sound barrier panel system from damage and wear during remainder of construction period. When remaining construction may affect or endanger sound barrier panel systems, inspect for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove sound barrier panel assemblies that do not comply with requirements, repair substrates and repair or reinstall sound barrier panel assemblies to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 02825

SECTION 02830

CHAIN LINK FENCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 2 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Furnish all labor, materials, equipment, facilities, transportation and services to complete all chain link fencing installations and related work as shown on the Drawings and/or specified herein.
 - 2. The general extent of the chain link fencing improvements is shown on the Drawings, and can include but is not necessarily limited to the following:
 - a. Galvanized chain link fabric, posts, gates, hardware, and related appurtenances
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittals."
 - 2. Division 2 Section "Site Portland Cement Concrete Paving."

1.03 REFERENCES

- A. ASTM A-120: Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc coated (Galvanized) Welded and Seamless, for Ordinary Uses
- B. ASTM A 123-84: Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- C. ASTM A 153-84: Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- D. ASTM A 392-84: Standard Specifications for Zinc-Coated Steel Chain Link Fence Fabric
- E. Chain Link Fence Manufacturers Institute (CLFMI)
- F. Industrial Steel Guide for Fence, Rails, Posts, Gates and Accessories
- G. State of California Department of Transportation Standard Specifications, 2002 Edition

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing chain link fencing including materials, concrete installation, post placement, and fencing installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for chain link fencing and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and/or standard catalog "cut-sheets" of all materials, coatings, fittings and equipment proposed to be furnished and installed under this portion of the work. Include the manufacturer's name and catalog number for each item where applicable. Clearly annotate (star or asterisk-in black ink) which portions of "cut-sheets" are applicable if more than one product is shown.
- B. Shop Drawings: Submit complete Shop Drawings for all different types and sizes of gates and fencing systems.
 - 1. Shop Drawings shall include, but may not be limited to:
 - a. All information regarding clearances, connections, components and any miscellaneous related appurtenances (such as wood baseboards, locking mechanisms etc.)
 - b. Concrete footing and reinforcement information
- C. Installation Instructions and/or Drawings: Submit as applicable.
- D. Samples: Color selections for finishes of vinyl and/or powder coated fencing systems.

1.06 SEQUENCE AND SCHEDULING

- A. Contractor shall coordinate construction timing of all chain link fencing and related work with installation of concrete work and all other work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General Note: It is intended that all fencing, by area, receive the same finish coating wherever possible. Nuts, bolts, applicable moving portions of hinges etc. shall be painted to match with PVC touch-up paint in vinyl or powder coated systems.
- B. Fabric:
 - 1. Selvage: Knuckled finish top and bottom.
 - 2. Steel Fabric: Comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual. Furnish one-piece fabric widths for fencing up to 16 feet high. Wire sizes include zinc coating.
 - 3. Size: Two (2) inch mesh, 9-gauge (0.148 inch diameter) unless noted otherwise.
 - 4. Galvanized Wire: Zinc coated wire-ASTM A 392, Class 1, with not less than 1.2 oz. zinc. per sq. ft.

5. Thermally Fused and Bonded PVC (vinyl coated) Finish: ASTM F 668 Class 2b, 7mil (0.18 mm) thickness thermally fused over zinc-coated wire. Color shall be: Black.

C. Framing:

1. Strength requirements for posts and rails shall conform to ASTM F 669.
2. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

<u>NPS in inches</u>	<u>Outside Diameter (OD) in inches</u>	<u>Type I Steel</u>	<u>Type II Steel</u>
1	1.315	1.68	1.35
1.25	1.660 (1-5/8")	2.27	1.84
1.5	1.900 (2")	2.72	2.28
2	2.375 (2-1/2")	3.65	3.12
2.5	2.875 (3")	5.79	4.64
3	3.500	7.58	5.71
3.5	4.000	9.11	6.56
4	4.500	10.79	---
6	6.625	18.97	---
8	8.625	28.55	---

D. Steel Framework:

1. Posts, Rails, Braces, and Gate Frames:
 - a. Type I Steel Pipe: Hot-dipped galvanized steel pipe conforming to ASTM F 1083, plain ends, standard weight (Schedule 40) with not less than 1.8 oz. zinc per sq. ft. of surface area coated.
 - b. Type II pipe: not applicable
2. End, corner, and pull posts for following fabric heights:
 - a. Under 6 feet: 2.375" OD
 - b. 6 feet to 10 feet: 3.5"
3. Line or intermediate posts for following fabric heights:
 - a. Under 6 feet: 1.90" OD (2" OD)
 - b. 6 feet to 8 feet: 2.375" OD
4. Top, Bottom and Horizontal Intermediate Rails:
 - a. Top, bottom and horizontal intermediate rails (as applicable) shall be 1.9' OD (1-5/8"OD)
5. Gate Posts: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:
 - a. 6 feet to 10 feet: 4.5" OD

- b. Under 6 feet: 2-7/8" OD
- 6. Gate Frames: Furnish frames (single or double gate), for nominal gate widths as follows:
 - a. 6 feet to 10 feet: 1.90" OD (2" OD)
 - b. Under 6 feet: 1.66" OD (1-5/8" OD)

E. Fittings and Accessories:

- 1. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel, to suit manufacturer's standards.
 - a. Zinc Coating: Unless specified otherwise, steel fence fittings and accessories shall be galvanized in accordance with ASTM A 153, with zinc weights per Table 1 of ASTM A153.
- 2. Tension Wire: 7-gauge (0.177 inch diameter) coil spring steel with finish to match fabric (where applicable).
- 3. Tie Wires: 9 gauge (0.148 inch diameter) steel with finish to match fabric.
- 4. Post and Line Caps: Provide weather tight closure cap for each post. Provide line post caps with loop to receive wire or top rail with finish to match fabric.
- 5. Tension Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross-section of 3/16 inch by 3/4 inch and minimum of 1.2 oz. zinc coating per sq. ft. of surface area.
- 6. Tension Clips: Minimum 3/4 inch wide 12-gauge (.105 inch) thick with finish to match fabric.
- 7. Diagonal Truss Rods: Shall be 3/8 inch diameter steel rods with fittings and Truss Tightener.
- 8. Hinges: Master Halco heavy duty, or acceptable equal.
- 9. Concrete: Concrete for footings shall be Class B minimum.
- 10. Locking device: shall be a Rolo Latch or approved equivalent

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to excavation, layout all fencing locations for review and acceptance by District's Representative.

3.02 INSTALLATION

- A. Conform to layout shown on Drawings, except as modified by the District's Representative.

- B. Erect in strict conformance with reviewed and accepted Drawings, Shop Drawings, and manufacturer's recommendations.
- C. Install new footings as shown on Drawings.
- D. Posts shall be installed vertical and plumb.
- E. General: Install fence in compliance with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.
- F. Excavation: Drill or hand-excavate holes for posts to diameter and spacing indicated in firm, undisturbed or compacted soil.
 - 1. Unless noted otherwise, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section of post.
 - 2. Unless noted otherwise, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.
- G. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space chain link posts maximum 10 feet o.c. and tube steel fence posts 7'8-3/4" maximum face to face, unless noted otherwise. Surface mount posts with mounting plates where indicated. Fasten with lag bolts and shields. Align tube steel fence panels between posts and firmly attach rail brackets to posts with 1/4" bolt and lock nut insuring panels and posts remain plumb.
- H. Top Rails: Run rail continuously through line posts caps, bending to radius for curved runs and at other posts termination into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.
- I. Bottom Rails: Install bottom rails between posts with fittings and accessories as shown in Drawings (as applicable).
- J. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- K. Tension Wire: As applicable, install at bottom of fabric (and at top if top rail is not specified) as shown in Drawings. Install tension wire before stretching fabric and attach to each post with ties. Secure wire to fabric with 12.5 gauge hog rings at 24" on center maximum.
- L. Fabric: Leave approximately 2 inches between finish grade and bottom selvages (1 inch at backstops) unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on tennis court or primary use side of fence (unless noted otherwise), and anchor to framework so that fabric remains in tension after pulling force is released.
- M. Tension Bars: Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric integrally woven into post. Thread through fabric, and secure to end, corner, pull, and gate posts with tension clips spaced not over fifteen (15) inches on center.

- N. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts 12 inches max. on center and to rails and braces 24 inches max. on center.
- O. Fasteners: Install nuts for tension clips and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- P. Welding: All welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to District's Representative. Any and all field welds shall be completed by a Certified Structural Welder and shall be "spray-galvanized" or otherwise treated subject to the discretion of the District's Representative.

END OF SECTION 02830

SECTION 02840

SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 2 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Provide metal signs and poles as shown on the plans for:
 - a. Traffic signs.
 - b. Handicapped parking space and lift zone.
- B. Related Sections include the following:
 - 1. Division 2 Section "Asphalt Concrete Paving."
 - 2. Division 2 Section "Site Portland Cement Concrete Paving."
 - 3. Division 2 Section "Pavement Markings and Striping."

1.03 REFERENCES

- A. Caltrans Standard Specifications, 2002 Edition, Section 56-2, "Roadside Signs," excepting the Measurement and Payment sections contained therein.
- B. Caltrans Standard Specifications, 2002 Edition, Section 75-1.05, "Galvanizing," excepting the Measurement and Payment sections contained therein.
- C. California Building Code, 1998 Section 1129B, "Accessible Parking Required."
- D. ASTM Designation: A 36/A 36M.
- E. ASTM Designation: A 325 or A 325M.
- F. All other governing codes and regulations.

1.04 MEASUREMENT AND PAYMENT

- A. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in placing traffic signs including materials, concrete installation, post placement, and sign installation as shown in the plans, as described herein, as specified by these specifications and as directed by the District shall be considered as included in the unit price paid for traffic sign and no additional compensation will be allowed therefor.

1.05 SUBMITTALS

- A. None required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Posts shall be metal and shall conform to the provisions in Section 56-2.02A, "Metal Posts," of the Caltrans Standard Specifications, 2002 Edition.
- B. Mountings for ground-mounted roadside signs shall be wide flange metal posts fabricated from structural steel conforming to the requirements in ASTM Designation: A 36/A 36M. Bolts, nuts, and washers for the breakaway connections of wide flange steel posts shall conform to the requirements in ASTM Designation: A 325 or A 325M.
- C. All metal parts of sign mountings shall be galvanized after fabrication. Galvanizing shall conform to the provisions in Section 75-1.05, "Galvanizing," of the Caltrans Standard Specifications.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions and the applicable provisions in Section 56-2.03, "Construction," of the Caltrans Standard Specifications, 2002 Edition. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
- B. Clean and protect work from damage.

END OF SECTION 02840

SECTION 02920

SOIL PREPARATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included: Provide all soil and soil amendments products, including all imported topsoil as required to make up deficiencies in quantity of soil available on site. Execute all labor to achieve soil preparation, complete, as shown and as specified.
- B. Products Installed But Not Furnished Under This Section:
- C. Related Work:
1. Finish Grading - Section 02210
 2. Irrigation System - Section 02810
 3. Soil Preparation- Section 02920
 4. Planting - Section 02950
 5. Landscape Maintenance - Section 02970
- D. Unit Pricing: Price for all accessories and components shall be included in the unit price of that item for which it is furnished.

Item	Unit Pricing
Organic Amendments	Cubic Yard
Soil Mixes	Cubic Yard
Topsoil Import	Cubic Yard

1.03 DEFINITIONS

- A. Existing Soil: Area of undisturbed native soil where no rough grading is to be done. No topsoil is to be placed. Only surface cultivation and soil amending are included in this Section. See Drawings.
- B. Subgrade: Soil level resulting from the rough grading work under another Section. Cultivation of all subgrade areas prior to amending is included in this section.
- C. Topsoil: Soil stockpiled for spreading over prepared subgrade.
1. Stockpiled Native Topsoil: Topsoil stripped from the site prior to rough grading work under another Section, to be spread and amended as work under this Section.
 2. Imported Topsoil: Off site topsoil imported and stockpiled under this Section, to be spread and amended also as work under this Section.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications of the following:
1. Fertilizer
 2. Nitrogen-treated sawdust
 3. Peat moss
 4. Herbicide
- B. Quality Control Submittals:
1. Testing Agency: Perry Soil Laboratory, 424 Airport Blvd., Watsonville, CA 95076, Tel. (831) 722-76063; Soil and Plant Laboratory, Inc., 352 Matthew Street (P.O. Box 153), Santa Clara, CA 95052, Tel. (408) 727-0330; or Root Zones Associates, P.O. Box 18911, San Jose, CA 95118, Tel. (408) 264-7024.
 2. Test Reports:
 - a. Organic Amendment: Test for physical and chemical properties. Submit test results to Owner's Representative.
 - b. Existing Site Soil: Test for physical and chemical composition and agricultural suitability for landscape planting.
 - c. Imported Topsoil: Test for parasitic nematodes and herbicide contamination and agricultural suitability for landscape planting. Submit test results to Owner's Representative.
 3. Certificates: Certify strict compliance with accepted soil mixes and amendments, including rate of application.

1.05 PROJECT/SITE CONDITIONS

- A. Existing Conditions: For protection of existing plants to remain, see Section 02120 - Existing Planting to Remain.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stockpiled Native Topsoil:
1. Quantity: The approximate quantity of stockpiled native top-soil will not be known until demolition and rough grading have been completed under Civil work.
 2. Stockpiling: Stripped topsoil shall have been stockpiled on the site under Civil work.
 3. Composition: Fertile, friable, well-drained soil, of uniform quality, free of stones 1/2-inch and larger diameter, sticks, oils, chemicals, plaster, concrete and other deleterious materials.
 4. Analysis: Obtain an agricultural suitability analysis of the proposed topsoil from an accepted, accredited Testing Agency at Contractor's cost.
 5. Test Results: Request Testing Agency to send one (1) copy of test results direct to the Landscape Architect and one (1) copy to the Owner. Imported topsoil shall be amended per soils analysis report.

B. Imported Topsoil:

1. Quantity: Import topsoil as soon as an insufficient quantity of native soil is verified. Quantity of topsoil to complete the work shall be calculated by the Contractor.
2. Cost: Paid for by the Owner on a unit price cost per cubic yard.
3. Stockpiling: Stockpile on site as directed by Owner.
4. Composition: To match or exceed in quality accepted native stockpiled topsoil, as determined by analysis similar to that described above.
5. Samples: The Landscape Architect reserves the right to take samples of the imported topsoil delivered to the site for conformance to the Specifications.
6. Rejected Topsoil: Immediately remove rejected topsoil off the site at Contractor's expense.

C. Backfill:

1. Native soil 65%
2. Nitrified redwood sawdust 35%
3. The following fertilizer adjustments should be added per cubic yard to the soil mixture. Actual amounts for specific locations on-site to be determined in soils report. The amounts are listed in lbs., except where noted in ounces.

Dolomite 65	3.0
Calcium carbonate lime	3.0
Urea formaldehyde (38-0-0)	1.5
Treble superphosphate (0-45-0)	2.0
Potassium sulfate (0-0-50)	1.0
Copper sulfate (25% Cu)	0.5 ozs.
Manganese sulfate (27% Mn)	1.0 ozs.

2.02 ACCESSORIES

A. Fine Sand:

1. Physical Properties (by dry weight basis):

Percent Passing	Sieve Size
100	4.76 mm(#4, 4 mesh)
95-100	1.00 mm (#18, 16 mesh)
65-100	500 micron (#35, 32 mesh)
0-50	250 micron (#60, 60 mesh)
0-20	105 micron (#140, 150 mesh)
0-5	53 micron (#270, 270 mesh)

2. Chemical Properties: (by Saturation Extract Method):

- a. Soluble Salts/Salinity: Maximum conductivity of 3.0 millimhos/cm at 25 degrees C.
- b. Boron: Maximum concentration of 1.0 ppm.
- c. Sodium Absorption Ratio (SAR): Maximum 8.0.

B. Water: Clean, fresh and potable, as available from Owner. Transport as required.

2.03 ORGANIC COMPONENTS

A. Nitrogen-Treated Sawdust:

1. Type: Derived from redwood.
2. Physical Properties:

Percent Passing	Sieve Size
95-100	6.35 mm. (1/4 in.)
80-100	2.38 mm. (#8, 8 mesh)
0- 30	500 micron (#35, 32 mesh)

3. Chemical Properties:
 - a. Nitrogen content (dry weight basis):
 - b. Wood of Redwood 0.4 - 0.6%
 - c. Iron content (dry weight basis): 0.08% iron as metallic, minimum.
 - d. Salinity/Soluble salts: Maximum 3.5 millimhos/cm 25 degrees C. as determined by saturation extract method.
 - e. Ash (dry weight basis): 0 - 6.0 percent maximum.
4. Treating Nitrogen Process: Thoroughly bulk-blend any of the following available sawdust types with the amendment specified:

Sawdust Urea Formaldehyde Per Cubic Yard

Redwood 2 lbs.

2.04 COMMERCIAL FERTILIZERS

- A. Pre-Plant Fertilizer: As described in 3.04, A.

2.05 CHEMICAL COMPONENTS

- A. The following additives may or may not be used depending on the outcome of the soils report.
 1. Ground Limestone: Agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass #100 sieve and 90% will pass #20 sieve.
 2. Dolomite 65.
 3. Gypsum: Agricultural grade product containing 80% minimum calcium sulfate.
 4. Iron Sulfate (Ferric or Ferrous): Supplied by a commercial fertilizer supplier, containing 20% to 30% iron and 35% to 40% sulfur.
 5. Sulfate of Potash: Agricultural grade containing 50% to 53% of water-soluble potash.
 6. Single Superphosphate: Commercial product containing 20% to 25% available phosphoric acid.
 7. Ammonium Sulfate: Commercial product containing approximately 21% ammonia.
 8. Ammonium Nitrate: Commercial product containing approximately 34% ammonia.
 9. Calcium Nitrate: Agricultural grade containing 15-1/2% nitrogen.

10. Urea Formaldehyde: Granular commercial product containing 38% nitrogen.
11. I.B.D.U. (Iso Butyldiene Diurea): Commercial product containing 31% nitrogen.
12. Soil Sulfur: Agricultural grade sulfur containing a minimum of 96% sulfur.
13. Iron Sequestrene: Geigy Iron Sequestrene 330 Fe, by Ciba-Geigy Corporation, (919) 292-7100.

PART 3 - EXECUTION

3.01 SOIL MOISTURE CONTENT

- A. General: Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and planting.
- B. Range: Maintain within 2 percent above or below optimum moisture content at all times during the work.

3.02 CLEARING AND CULTIVATION

- A. Clearing: Clear all planting areas of stones 1/2-inch diameter and larger, weeds, debris and other extraneous materials prior to soil preparation work.
- B. Cultivation of Existing Soil:
 1. Cultivation: Rip or cultivate areas of existing soil to receive planting to a depth of eight (8) in. immediately prior to applying soil amendments.
 2. Trees to Remain: Hand cultivate within the dripline of existing trees to remain. Depth of cultivation shall not exceed 2 in. Cultivate immediately prior to amending existing soil.
- C. Cultivation of Subgrade:
 1. Verification:
 - a. Verify that subgrades for installation of topsoil have been established under rough grading. Do not spread topsoil prior to acceptance of subgrade work.
 - b. Depth: Verify that subgrades are 12 in. minimum below finished grades, + 1 in. Report all variations.
 2. Cultivation: Rip or cultivate subgrade in planting areas to a depth of 6 in. immediately prior to spreading topsoil.

3.03 SPREADING OF TOPSOIL

- A. General: Spread Stockpiled topsoil over accepted subgrade prior to incorporating amendments.
- B. Restrictions: Do not commence spreading of topsoil prior to acceptance of soil cultivation above. Do not place topsoil under muddy (or frozen) conditions.
- C. Topsoil Depth: Minimum depth of 12 in. after natural settlement and light rolling conforming to finished grades shown on Drawings.

3.04 SOIL AMENDMENT

A. Amending of Existing Soil:

1. Preparation: Do not commence amending of existing soil prior to acceptance of soil cultivation above. Do not work soils under muddy or (frozen) conditions.
2. Soil Amendments per 1,000 Square Feet: Actual amounts will be determined by soils report. Incorporate thoroughly with top eight (8) in. of all existing planting areas:

Nitrified redwood sawdust	6 cubic yards
Dolomite 65	50 lbs.
Urea Formaldehyde (Nitroform, 38-0-0)	25lbs.
Calcium carbonate lime (Oyster shell lime)	50 lbs.
Treble superphosphate (0-45-0)	35 lbs.
Potassium sulfate (0-0-50)	20 lbs.
Copper sulfate (25% Cu)	0.5 lbs.
Manganese sulfate (27% Mn)	1.0 lbs.

B. Amending of Spread Topsoil:

1. Soil Amendments per 1,000 square feet: Incorporate thoroughly with top eight (8) in.:

Nitrogen-treated Sawdust	6 cu. yd.
6-20-20 Commercial Fertilizer	30 lbs.
Dolomite Lime	50 lbs.
Iron Sulfate	10 lbs.
Polymer Amendment	15 lbs.

2. Intent: The above amendments and quantities are approximate and are for bidding purposes only. Following an on-site topsoil analysis by Testing Agency, composition of amendments may change. Contract Price will be adjusted accordingly.

3.05 BLENDING OF SOIL MIXES

- A. Acid-loving Planting Mix: Thoroughly bulk blend all mixes in stockpiles on site. Do not blend in individual plant pits.

3.06 FIELD QUALITY CONTROL

- A. Tests: Right is reserved to take samples of soil mixes and prepared soil for testing for conformity to Specifications.
- B. Rejected Materials: Remove off site at Contractor's cost. Pay cost of testing of materials, not meeting Specifications.

END OF SECTION 02920

SECTION 02950

PLANTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included: Provide planting complete, as shown and as specified.
- B. Related Work:
 - 1. Existing Planting to Remain - Section 02120
 - 2. Finish Grading - Section 02210
 - 3. Irrigation System - Section 02810
 - 4. Soil Preparation - Section 02920
 - 5. Landscape Maintenance - Section 02970
- C. Unit Pricing: Cost of all products used in installation shall be included in the unit price of the item for which they are furnished.

Item	Unit Pricing
Plants	Each
Groundcover	Square Foot
Mulch	Square Foot

1.03 REFERENCES

- A. "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington, (Number 4091)", McClintock and Leiser, Division of Agricultural Sciences, University of California, 1979.
- B. "American Standard for Nursery Stock", 1986 Edition, American Association of Nurserymen, Inc.
- C. "Hortus III", 1976 Edition, Bailey Hortorium, Cornell University.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications of the following:
 - 1. Mulch and fertilizer tablets.
 - 2. Tree stakes.
 - 3. Tree straps.
 - 4. Anti-desiccant.
 - 5. Nursery grade vine adhesive.
- B. Shop Drawings: Locations of fences and/or barriers at drip lines of existing

trees/plants to remain.

C. Samples:

1. Mulch: One (1) pint.

D. Certificates of Inspection: As required by law for transportation of each shipment of plants along with invoice.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Do not deliver disease-infected plant materials to the site .

B. Labeling: Furnish standard products in manufacturer's standard containers bearing original labels legibly showing quantity, analysis, genus/species and name of manufacturer/grower.

C. Storage: Protect metal containers from sun during summer months with temperatures above 80 degrees F. Keep plants that cannot be planted immediately upon delivery in the shade, well-protected and well-watered.

1.06 SEQUENCING AND SCHEDULING

A. Acceptance: Do not install plant materials prior to acceptance of finish grades and main line trenching/installation of irrigation system.

B. Coordination: Coordinate with work of other sections to insure the following sequence of events:

1. General: Sprinkler system to be installed and operable prior to installation of plant materials. Schedule hand watering of all plant materials installed prior to sprinkler irrigation system.

2. Plants in Pots: Schedule delivery of plants to coincide with installation of pots as determined by Owner.

3. Headers: Install prior to installation of adjacent sprinkler irrigation system.

4. Vines: Do not attach anchors or ties to wall or other structures prior to acceptance of such work under another Section.

5. Trees in Paving: As necessary, install prior to installation of paving under another Section. See Drawings.

6. Pruning: Do not prune plant materials prior to installation and acceptance. Request review by Landscape Architect prior to pruning.

1.07 WARRANTY

A. Warrant that all plants planted under this Contract will be healthy and in flourishing condition of active growth one (1) year from date of Final Acceptance. Similarly warrant (annuals), groundcover for a period of six (6) months from date of Final Acceptance.

B. Correct Species: Warrant that all plant materials are true to species and variety.

C. Delays: Delays caused by the Contractor in completing planting operations which extend the planting into more than one planting season shall extend the Warranty Period correspondingly.

- D. Condition of Plants: Plants shall be free of dead or dying branches and branch tips, with foliage of normal density, size and color.
- E. Replacements: As soon as weather conditions permit, replace, without cost to Owner all dead plants and all plants not in a vigorous, thriving condition, as determined by Landscape Architect during and at the end of Warranty Period.
- F. Exclusions: Contractor shall not be held responsible for failures due to neglect by Owner, vandalism, and acts of Nature, during Warranty Period. Report such conditions.

1.08 MAINTENANCE PERIOD AND FINAL ACCEPTANCE

- A. See Section 02970 - Landscape Maintenance

1.09 REPLACEMENTS

A. Failed Materials:

1. Repair and/or replace at no cost to the Owner all plant materials exhibiting conditions which are determined as unacceptable due to workmanship by the Contractor.
2. Closely match replacements to adjacent specimens of the same species. Apply requirements of this Specification to replacements.
3. Contractor shall be held responsible for a maximum of two (2) replacements for each failed tree, shrub and vine, and same area of groundcover planting after final acceptance during warranty period.

B. Incorrect Materials:

1. During Warranty Period, replace at no cost to Owner plants revealed as being untrue to name and species.
2. Provide replacements of a size and quality to match the planted materials at the time the mistake is discovered.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plant Materials: Verify that all container stock has been grown in the containers in which delivered for at least one growing season, but not over two (2) years.
 1. Growing Conditions: Plants shall be nursery-grown in accordance with good horticultural practices under climatic conditions similar to those of the project for at least two years unless otherwise specifically authorized.
 2. Appearance: Trees shall be exceptionally heavy, symmetrical, tightly knit, and so trained or favored in development and appearance as to be superior in form for their species, with regard to number of branches, compactness and symmetry.
 3. Vigor: Plants shall be sound, healthy and vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs, or larvae. They shall have healthy, well-developed root systems. Plants shall be free from physical damage or adverse conditions which would prevent thriving growth.

- B. Condition of Root System: Samples must prove to be completely free of circling, kinked or girdling trunk surface and center roots and show no evidence of a pot-bound condition. Upon inspection by Landscape Architect at the job site, if five (5) percent or more of the plants of each species are found to contain kinked, circling or girdling roots, all plants of that species will be rejected.
- C. Measurements:
1. General: Take caliper measurement at a point on the trunk 6 in. above natural ground line for trees up to 4 in. in caliper (and at a point 12 in. above the natural ground line for trees over 4 in. in caliper.)
 - a. Measure foliage across mean foliage dimension when branches are in their normal upright position. Foliage origin along main trunk shall be measured from soil line.
 - b. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Properly trimmed plants shall measure the same in any direction. If a plant is unevenly grown, it shall be classified in the size category of the smallest dimension.
 2. Size Range: If a range of size is given, do not use plant materials less than the minimum size. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.
 3. Substitutions: Substituted plants shall be true to species and variety and shall conform to measurements specified except that plants larger than specified may be used if accepted. Use of such plants shall not increase Contract price. If larger plants are accepted, increase the ball of earth in proportion to the size of the plant. Plants overgrown for their container size will be rejected.
- D. Unacceptable Trees: Trees which have damaged or crooked leaders, will be rejected. Trees having a main leader shall not have been headed back. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 3/4 in. which have not completely callused, will be rejected.
- E. Pruning: Do not prune plants before delivery. Consult Landscape Architect for pruning after installation.
- F. Field Dug Stock: Prior to digging of field grown plant materials, insure that excess loose fill resulting from cultivation around stems and over roots be removed down to natural finish grade at crown of plant materials. During digging, verify that size of tree spade or other equipment is adequate to encompass the actively-growing root zone of all plants. Plants which, after digging, show mostly large fleshy roots and few fibrous roots will be rejected.

2.02 MIXES

- A. Backfill Mix for Plant Pits: See Section 02920 - Soil Preparation.
- B. Commercial Fertilizers:
1. Top-dress Fertilizer: Complete fertilizer, 50 percent of the nitrogen to be derived from natural organic sources or urea-form. Available phosphoric acid shall be

from superphosphate, bone or tankage. Potash shall be derived from muriate of potash containing 60 percent potash:

- a. 16% Nitrogen.
 - b. 6% Phosphoric Acid.
 - c. 8% Potash.
2. Slow-release Fertilizer Tablet: "Agriform" 21 gram tablets with 20-10-5 (N-P-K) by Sierra Chemical Co., (408) 263-8080.

C. Anti-Desiccant/transpirant:

1. Type: Sprayable, water-soluble pine oil complex which will produce a moisture-retarding barrier not removable by rain (or snow).
2. Product: "Wilt-Pruf" by Wilt-Pruf Products, Inc., Greenwich, CT.

2.03 ACCESSORIES

A. Tree Staking:

1. Stakes: Lodgepole Pine with 10 in. tapered driving point and chamfered top, green color, treated with copper naphthanate to heartwood. Product: "The Original Lodgepole Pine Tree Stake", by BVC Stakes, Alviso, CA.
2. Ties: Wonder Tree Tie, by The Wonder Tree Tie, Placentia, CA.
3. Auxiliary Stakes: 1/4 in. - 1/2 in. diameter spring-steel wire, fiberglass rod, bamboo, or split wood, as accepted by Landscape Architect. Stakes shall have no rough or sharp edges capable of damaging bark.

B. Tree Guying:

1. Ground Anchors: Duckbill-type galvanized steel ground anchor and cable assembly, by Foresight Products, Inc., (800) 325-5360 or accepted equal.

C. Vine Supports:

1. Anchors: Galvanized metal or plastic epoxy-fastening type as accepted.
2. Tape: Polyethylene nursery tape, 1/2 in. width, black or green in color.

D. Wood Chip Mulch:

1. Type: Composted redwood, pine or fir bark, free of sticks, dirt, dust and other debris, as accepted.
2. Size: 1/2 in. to 1 in. diameter.

E. Water:

1. Clean, fresh and potable, furnished and paid for by Owner.
2. Transport as required.

2.04 SOURCE QUALITY CONTROL

- A. Review: Submit a written request for review of plant materials and quantity at place of growth at least thirty (30) days after award of contract. Right is reserved to refuse review at this time if, in his judgment, a sufficient quantity of plants is not available.

- B. Transportation: Contractor shall accompany Landscape Architect to all review(s) of plant materials at the nursery. Landscape Architect will review and tag plants at place of growth and upon delivery for conformity to specifications.
- C. Distant Material: Submit photographs with a person adjacent to each plant type for preliminary review. Such review shall not impair the right of review and rejection during progress of the work.
- D. Unavailable Material: If proof is submitted that a specified plant is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Substantiate such proof in writing no later than 30 days after award of contract.
- E. Special Conditions: The above provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Finish Grades: Finish grades for planting areas shall have been established in another Section. Verify that all grades are within 1 in. plus or minus of required finish grade.
 - 2. Soil Preparation: Do not commence planting work prior to completion and acceptance of soil preparation.
 - 3. Irrigation: Verify that irrigation system has been installed and accepted.

3.02 PREPARATION

- A. Layout and Staking: Lay out plants at locations shown on Drawings. Use 3 -ft. lath, color-coded for each species of plant material. Stake each tree, not specifically located by dimension or alignment. Outline shrub and groundcover beds with lime.
- B. Review: Locations of plants will be checked in the field and will be adjusted to exact position before planting begins. Right is reserved to refuse review at this time if, in the Landscape Architect's opinion, an insufficient quantity of plants is available.
- C. Digging Plant Pits: Dig tree pits and scarify all sides of the tree pit after excavation - see below. Do not use an auger or tree spade.
- D. Containerized Plant Pits: Excavate square plant pits as follows:

Item	Width	Depth
Boxed Trees	Box + 24 in.	Box
Canned Trees	Can + 18 in.	Can
Canned Shrubs and Vines	Can + 12 in.	Can
60 in. box or larger, increase size of pit by 12 in.		

E. Ball and Burlap Plant Pits: Excavate square plant pits as follows;

Item	Width	Depth
Trees	Ball + 24 in.	Ball
Shrubs (and Vines)	Ball + 12 in.	Ball
Groundcover Beds	As required	6 in.

3.03 DRAINAGE TEST OF PLANT PITS/OBSTRUCTIONS

- A. Testing: Immediately after completion of excavation, test drainage of plant pits by filling with water twice in succession. Give written notification of conditions permitting the retention of water in plant pits for more than twenty-four (24) hours.
- B. Correction: Submit for acceptance a written proposal and cost estimate for the correction of poor drainage conditions before proceeding with planting.
- C. Obstructions: If rock, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits, acceptable alternate locations may be used at direction of Landscape Architect.
- D. Percolation Test Pit:
 - 1. Location: At two (2) locations as determined by the Landscape Architect on site.
 - 2. Restrictions: Do not perform test on a rainy day (or during freezing weather). Repeat all tests interrupted by rain or cold.
 - 3. Procedure:
 - a. Dig test pit of a size specified for the tree pits, a minimum of 4 ft. deep. Legibly calibrate a stake at 1 in. intervals and drive it firmly into the undisturbed soil at the bottom of the pit.
 - b. Fill test pit with water to within 1 ft. of the finish grade. Immediately record water level on the stake.
 - c. After 3 hours, record water level again. Repeat recording of water level once each hour for the succeeding five hours.
 - 4. Documentation: Submit written documentation of all test pit results, dated and signed by the tester.

3.04 HEADERS

- A. Lay out locations of headers for review prior to final installation. Install per details in Drawings true to line and grade.

3.05 TREE, SHRUB AND VINE PLANTING

- A. Handling and De-potting of Plant Materials:
 - 1. Damage: Avoid damage to containers and rootballs. If rootball is cracked or broken during handling and de-potting, plant will be rejected. Do not remove plant from container prior to completion of plant pit preparation.
 - 2. Canned Trees and Shrubs: Metal Containers: Cut can on two sides with accepted cutting tool. Do not use spade. Plastic Containers: Tip container to horizontal orientation and shake carefully to remove shrub. Support rootball during

- installation to prevent cracking or shedding of soil.
3. Boxed Trees: Lift from bottom with forklift or from sides with 2 in. x 4 in. rails nailed to each side of box. Do not remove box prior to settling tree in plant pit. Remove sides of box after acceptance by Landscape Architect and prior to backfilling.
 4. Balled and Burlapped Plants: Lift and carry by bottom of ball only. Do not remove wrapping until plant is set in plant pit. Cut all wire and peel wire and burlap away from upper 1/3 of rootball prior to backfilling.

B. Installation:

1. Scarification:

- a. Plant Rootball: After removing plant from container, scarify the sides of the rootball to a depth of 1 in. at four to six equally-spaced locations around the perimeter of the ball or at 12 in. intervals on sides of boxed materials. Cut and remove circling roots over 3/8 in. diameter.
- b. Plant Pit: Scarify sides of plant pit, thoroughly breaking up surfaces and eliminating "glazed" areas.

2. Positioning: Backfill plant pit to allow setting crown of tree 2 in. above new finish grade and crown of shrub 1 in. above finish grade. Thoroughly foot tamp all backfill. Position plant in planting pit, maintaining plumb condition. Maintain throughout all planting operations.

3. Backfilling:

- a. Use backfill mix to backfill plant pits as shown on Drawings. Brace each plant plumb and rigidly in position until planting soil has been tamped solidly around the ball and roots.
- b. When plant pits have been backfilled approximately 2/3 full, water thoroughly and saturate rootball, before installing remainder of the backfill mix to top of pit, eliminating all air pockets.

4. Staking and/or Guying: When required, stake or guy as specified below.

5. Slow-release Fertilizer Tablets: Place evenly distributed in plant pits when backfilled 2/3 according to the following schedule or per Manufacturer's latest specifications.

- a. 1 gallon can - 2 tablets 24 in. box - 8 tablets.
- b. 5 gallon can - 4 tablets 36 in. box - 10 tablets.
- c. 15 gallon can - 6 tablets 48 in. box - 12 tablets.

C. Watering Basin: Form saucer with 3 in. high berm centered around tree and shrub pits 12 in. wider than ball diameter. Do not form saucer around trees in lawn areas.

D. Training of Vines: Secure to fence or wall with green polyethylene tape at ten (10) in. intervals. Secure to fence as directed by Landscape Architect at the site.

E. Watering: Immediately water all plants after completion of planting operations.

3.06 STAKING AND GUYING

A. General:

1. Trees shall be able to stand upright without support, and shall return to the vertical after their tops have been deflected horizontally and released. Stake or guy trees which do not meet this qualification.
2. Trees shall remain plumb and straight from installation through the warranty period.
3. Tree support, if required, shall be done as outlined on the following tables.

B. Staking: Stake all trees under 3-1/4 in. caliper in accordance with the following table:

Tree Caliper @ 12 in. Above-Grade	# Stakes	Stake Size
To 1-3/4 in.	2	2 in. Diam. x 8 ft. min.
2 in. to 3 in.	2	3-1/2 in. Diam. X 10 ft. min.

1. Locate stakes as detailed in the Drawings, perpendicular to prevailing wind and as close to the main trunk as is practical, avoiding root injury. Drive stakes at least 36 in. into firm ground.
2. Nail 1 in. x 4 in. spreader board to stakes at detailed height making sure minimum trunk clearance is maintained.
3. Remove nursery-supplied stake and tie to new stakes using two tree ties. Find proper height for point of tree ties and attach as follows:
 - a. Hold trunk in one hand, pull top to one side and release. Height at which trunk will snap back to upright position while hand-held is Base Height. Attach tree ties to trunk 6 in. above Base Height.
 - b. Nail rubber ties to stakes using two (2) galvanized roofing nails at each end of tie. After total securement, cut off stakes to an even height determined by the Landscape Architect.
 - c. If trunk is too "whippy" to support tree plumb, use auxiliary stake as follows:
 - 1) Attach auxiliary stake as required to support trunk. Extend stake 30 in. below finish grade up to a point no closer than 24 in. from top of leader.
 - 2) Round and wrap the ends of the stake with friction tape. Attach stake to trunk with 1 in. wide vinyl or polyethylene tape at 10 in. to 15 in. intervals.

C. Guying:

1. Positioning: Guy trees at points of branching, with guys spaced equally around and outside perimeter of ball. Cover guys with rubber hose at points of contact with bark. Position guys at crotches and fasten to a deadman.
2. Turnbuckle: Provide one (1) turnbuckle for each guy. Use 2 cable clamps at each cable connection. (Place white plastic guy covers on all guys.)

3. Mock-Up: Install mock-up of manufactured project at job site per manufacturer's instructions for review and acceptance by Landscape Architect.

Tree Caliper @ 12 in. Above Grade	Guys	Size	Turn-Buckle	Deadman / Anchor
3 in. to 6 in.	3	1/8" 7 x 7	3/8" x 10-5/8	4" x 4" x 24", 18" Deep
6 in. to 8 in.	3	3/16" 7 x 7	3/8" x 10-5/8	6" x 6" x 30", 30" Deep

3.07 PRUNING

- A. See Section 02970 - Landscape Maintenance.

3.08 MULCHING

- A. Install a three (3) in. deep layer of mulch over all shrub areas including tree and shrub watering basins.
- B. Do not mulch groundcover areas.

3.09 GROUNDCOVER PLANTING

- A. Top-dress Fertilizer: Apply per soils report immediately after completion of planting.
- B. Watering: Immediately water groundcover areas after fertilizer application to wash fertilizers from leaves of plants.

END OF SECTION 02950

SECTION 02970

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work Included: Provide continuous Landscape Maintenance, complete as specified during progress of the work, after installation, and for a period of 90 days after Preliminary Acceptance.
- B. Related Work:
 - 1. Existing Planting to Remain - Section 02120
 - 2. Finish Grading - Section 02210
 - 3. Irrigation System - Section 02810
 - 4. Soil Preparation - Section 02920
 - 5. Planting - Section 02950
 - 6. Landscape Maintenance - Section 02970
- C. Unit Pricing: Lump sum.

1.03 REFERENCES

- A. University of California Cooperative Extension Publications:
 - 1. "Fertilizing Woody Plants", Leaflet #2958, Sept. 1979.
 - 2. "Pruning Landscape Trees", Leaflet #2574, Jan. 1979.
 - 3. "Staking Landscape Trees", Publication #AXT-311.
- B. "Arboriculture: Care of Trees, Shrubs and Vines in the Landscape" by Richard W. Harris, Prentice-Hall, Inc. 1983.

1.04 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Schedule of maintenance operations and monthly status report including list of equipment, materials proposed for the job and watering schedule.
 - 2. Licenses, permits and insurances required by the City of Santa Cruz , the State or Federal government pertaining to maintenance work.
 - 3. Monthly record of all herbicides, insecticides and disease control chemicals used for the project.
 - 4. Documentation of existing planting and irrigation system.
 - 5. Written application recommendation by a licensed agricultural pest control advisor for all weed, pest and disease controls restricted by the Director of Agriculture proposed for this work.

- B. Project Close-out Submittal: Include in a single, 3-ring binder a landscape maintenance manual containing an indexed collection of all schedules, records and permits listed above, as well as a documentation of accepted condition of planting and irrigation at Final Acceptance.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Experience: The landscape contractor or maintenance subcontractor shall have a full-time employee assigned to the job as foreman for the duration of the contract. He/she shall have a minimum of four (4) years experience in landscape maintenance supervision, with experience or training in entomology, pest control, soils, fertilizers and plant identification.
2. Labor Force: The landscape maintenance labor force shall be thoroughly familiar with, and trained in, the work to be accomplished and shall perform the task in a competent, efficient manner acceptable to the Owner.

B. Requirements:

1. Supervision: The foreman shall directly supervise the work force at all times. Notify Owner of all changes in supervision.
2. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and labor force. Be uniformly dressed in a manner satisfactory to the Owner.

1.06 PROJECT/SITE CONDITIONS

- A. Site Visit: At beginning of maintenance period, visit and walk the site with the Owner's representative to clarify scope of work and understand existing project/site conditions.
- B. Documentation of Conditions: Document general condition of existing trees, shrubs, vines, groundcovers and lawn recording all plant materials which are healthy, thriving, damaged, dead or dying.
- C. Irrigation System: Document general condition of existing irrigation system, making sure that faulty electrical controllers, broken or inoperable sprinkler heads or emitters are reported.

1.07 SEQUENCING AND SCHEDULING

- A. Perform all maintenance during hours mutually agreed upon between Owner and Contractor.
- B. Work force shall be present at the project site at least once a week and as often as necessary to perform specified maintenance in accordance with the approved maintenance schedule.

1.08 WARRANTY

- A. Specific Requirements: Refer to the following sections:
 1. Planting - Section 02950.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: All materials and equipment shall be provided by the Contractor, except as specified below.
- B. Water: Clean, potable and fresh, as available from Owner
- C. Fertilizers:
 - 1. Tightly-compressed, slow-release and long-lasting complete fertilizer tablets bearing manufacturer's label of guaranteed analysis of chemicals present.
 - 2. Balanced, once-a-season application, controlled-release fertilizers with a blend of coated prills which supply controlled-release nitrogen, phosphorus and potassium, and uncoated, rapidly soluble prills containing nitrogen and phosphorus.
- D. Herbicides, Insecticides, and Fungicides:
 - 1. Best quality materials with original manufacturers' containers, properly labeled with guaranteed analysis.
 - 2. Use non-staining materials.
- E. Replacement Tree Guys, Stakes, Ties and Wires: Match originally accepted existing materials on the site.

2.02 EQUIPMENT

- A. General: Use only the proper tool for each job. Maintain all tools in sharp, properly-functioning condition. Clean and sterilize pruning tools prior to usage.
- B. Insect/Disease Prevention: Take all acceptable measures to prevent introduction of insect or disease-laden materials onto the site. Planting - Section 02950.

PART 3 - EXECUTION

3.01 ESTABLISHING THE MAINTENANCE PERIOD

- A. Preliminary Review: As soon as planting is substantially completed per documents, hold a preliminary review to determine the condition of the work.
- B. Date of Review: Notify Landscape Architect at least five (5) working days prior to anticipated date of review.
- C. Beginning of the Maintenance Period: The date on which the Landscape Architect issues a letter of Preliminary Acceptance to the Contractor.

3.02 PREPARATION

- A. Protection:

1. Protect all new planting areas from damage of all kinds from beginning of work until sufficiently established or until Final Acceptance.
2. Provide temporary protection fences, barriers and signs as required for protection.

B. Replacements:

1. Immediately treat or replace all plants which become damaged or injured as a result of Contractor's operations or negligence, as directed by Landscape Architect, at no cost to Owner.
2. Replacement plants shall match size, condition and variety of plants replaced.

3.03 PLANTING

A. Watering Basins:

1. Maintain all watering basins around plants so that enough water can be applied to establish moisture through major root zones.
2. For supplemental hand watering of watering basins, use a water wand to break the water force. Do not permit use of "jet" type watering equipment. Do not permit crown roots to become exposed to air through dislodging of soil and mulch.
3. Maintain originally called for depth of mulch to reduce evaporation and frequency of watering.
4. In rainy season, open basins to allow surface drainage away from the root crown where excess water may accumulate. Restore watering basins at end of rainy season.
5. At end of rainy season, form watering basins at trees and shrubs as specified in Section 02120 - Existing Planting to Remain.

B. Resetting: Reset plants to proper grades and upright position.

C. Weed Control:

1. All areas between plants, including watering basins, shall be weed free at all times.
2. Use only recommended and legally approved herbicides to control weed growth.
3. Avoid frequent soil cultivation that destroys shallow roots and breaks the seal of pre-emergent herbicides.

D. Pruning:

1. Prune trees to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached, and which have vertical spacing of 18 in. to 48 in. and radial orientation so as not to overlay one another.
2. Prune trees to eliminate diseased or damaged growth, and narrow V-shaped branch forks that lack strength. Reduce toppling and wind damage by thinning out crowns.
3. Prune trees to maintain growth within space limitations, maintaining a natural appearance and balancing crown with roots.
4. No stripping of lower branches ("raising up") of young trees will be permitted.
5. Retain lower branches in a "tipped back" or pinched condition to promote caliper trunk growth (tapered trunk). Do not cut back to fewer than six buds or leaves on such branches. Only cut lower branches flush with the trunk after the tree is able to stand erect without staking or other support.

6. Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Do primary pruning of deciduous trees during the dormant season. Do not permit any pruning of trees prone to excessive "bleeding" during growth season.
7. Prune damaged trees or those that constitute health or safety hazards at any time of year as required.
8. Make all cuts clean and close to the trunk, without cutting into the branch collar. "Stubbing" will not be permitted. Cut smaller branches flush with trunk or lateral branch. Make larger cuts (1 in. in diameter or larger) parallel to shoulder rings, with the top edge of the cut at the trunk or lateral branch.
9. Branches too heavy to handle shall be precut in three stages to prevent splitting or peeling of bark. Make the first two cuts 18 in. or more from the trunk to remove the branch. Make the third cut at the trunk to remove the resulting stub.
10. Do not prune or clip shrubs into balled or boxed forms unless specifically called for by design.
11. Clip shrubs to be hedged when branches project 2 in. beyond limit of clipped hedge shown on the Drawings.
12. Take extreme care to avoid transmitting disease from one infected plant to another. Properly sterilize pruning tools before going from one infected plant to all other plants.

E. Staking and Guying of Trees:

1. Inspect stakes and guys at least once a month to check for rubbing that causes bark wounds.
2. Conform to the recommended procedures of staking and guying as outlined in the University of California Publication AXT-311, "Staking Landscape Trees."

F. Maintenance of Existing Plantings to Remain:

1. General: Conform to all applicable paragraphs regarding pruning, watering, spraying and fertilizing of new plant materials as specified in this section.
2. Symptoms: Be alert to symptoms of construction damage to existing plantings as evidenced by wilting, unseasonal or early flowering or loss of leaves, and insect or disease infestation due to declining vigor.
3. Notification: Submit in writing of evidences of declining vigor immediately upon discerning the problem. Take appropriate interim measures to mitigate the severity of the problem as specified in this section.
4. Proposal: Submit written proposal and cost estimate for the correction of all conditions before proceeding with permanent correction work.

3.04 GROUNDCOVERS

A. Watering:

1. Check for moisture penetration throughout the root zone at least twice a month.
2. Water as frequently as necessary to maintain healthy growth of groundcovers.

B. Weed Control:

1. Control weeds, preferably with pre-emergent herbicides and with selective systemic herbicides.
2. Minimize hoeing of weeds in order to avoid plant damage.

C. Fertilization:

1. Recently installed plant materials: Verify with Owner actual completion date of planting installation and rate of prior application of fertilizers.
2. New plant materials: Place one (1) 5-gram tablets (20-10-5; N-P-K) beside the root ball about an inch from root tips.
3. Established Plant Materials: Do not use complete fertilizers unless soil test shows specific nutrient deficiencies.

D. Mowing and Edging:

1. Edge groundcovers to keep in bounds. Trim top growth as necessary to achieve an overall even appearance.
2. Groundcovers which lend themselves to mowing shall be mowed to specified height above finished grade in order to renew growth, improve density and attractiveness.

E. Replace dead and missing plants after obtaining Owner's agreement to pay for replacement. Damages due to Contractor's negligence shall be paid for without charge to Owner.

3.05 ANNUALS AND PERENNIALS

A. Watering:

1. Hand-water all pre-cast pots and planters without an automatic irrigation system.
2. Species, sizes of plants, container sizes and orientation shall dictate frequency of watering. Submit to Owner a watering schedule for different seasonal requirements.

B. Weed Control: All planters with annuals and perennials shall be weed-free at all times.

C. Pruning:

1. Limit pruning to removal of damaged or dead twigs and foliage.
2. Remove spent flowers on a weekly basis.

D. Replacements of Annuals:

1. Replace annuals when materials exhibit a "spent" condition.
2. Thoroughly cultivate soil after removal of "spent" or "dead" plants prior to planting new materials.

E. Fertilization: Incorporate slow release fertilizers per manufacturer's current specifications, and rake smooth.

3.06 INSECTS, PESTS, AND DISEASE CONTROL

A. Inspection: Inspect all plant materials for signs of stress, damage and potential trouble from the following:

1. Presence of insects, moles, gophers, ground squirrels, snails and slugs in planting areas.

2. Discolored or blotching leaves or needles.
 3. Unusually light green or yellowish green color inconsistent with normal green color of leaves.
- B. Personnel: Only licensed, qualified, trained personnel shall perform spraying for insect, pest and disease control
- C. Application: Spray with extreme care to avoid all hazards to any person or pet in the area or adjacent areas.

3.07 IRRIGATION SYSTEM

A. General:

1. Repair without additional charge to Owner all damages to system caused by Contractor's operations. Perform all repairs within one (1) watering period.
2. Report promptly to Owner all accidental damage not resulting from Contractor's negligence or operations.
3. Do not run the irrigation system during rainy season. Set and program automatic controllers for seasonal water requirements.
4. Twice a month, use a probe or other acceptable tool to check the rootball moisture of representative plants as well as the surrounding soil.

B. Cleaning and Monitoring the System:

1. Continually monitor the irrigation systems to verify that they are functioning properly as designed. Make program adjustments required by changing field conditions.
2. Clean pump filter and strainer at least once a year and as often as necessary to keep the irrigation systems free of sand and other debris.
3. Prevent spraying on windows, building walls, by balancing the throttle control on the remote control valves and the adjustment screws on the sprinkler heads. Do not allow water to atomize and drift.

3.08 TERMINATION OF THE MAINTENANCE PERIOD

A. Final Acceptance Procedure:

1. Work will be accepted by the Landscape Architect upon satisfactory completion of all work, including maintenance period, but exclusive of replacement of materials under the Warranty Period.
2. Submit a written request to Landscape Architect for review for Final Acceptance at least five (5) working days prior to anticipated Final Review date, which is at the end of the Maintenance Period.

B. Corrective Work:

1. Work requiring corrective action or replacement shall be performed within ten (10) calendar days after the Final Review.
2. Perform corrective work and materials replacement in accordance with the Drawings and Specifications, and shall be made by the Contractor at no cost to the Owner.
3. After corrective work is completed, the Contractor shall again request a Final Review for Final Acceptance as outlined above.

4. Continue maintenance of all landscaped areas until such time as all corrective measures have been completed and accepted.

C. Conditions for Acceptance of Work at End of Maintenance Period:

1. Each plant shall be alive and thriving, showing signs of growth and no signs of stress, disease, or any other weaknesses.
2. Replace all plants not meeting these conditions. An additional Warranty Period equal in length to the original shall be commenced for all such plants and planted areas.

- D. Final Acceptance Date: The date on which the Landscape Architect issues a Letter of Final Acceptance. Upon Final Acceptance, the Owner will assume responsibility for maintenance of the work.

3.09 CLEANING

- A. Dispose of all pruned materials, vacuum all lawn clippings and leaves, sweep all walkways and rake smooth all mulched areas.
- B. Remove from the site all containers and evidence of maintenance activities.

3.10 CLOSE OUT

- A. Landscape Maintenance Record: Submit binder to Owner with all documentation and records required and utilized during the maintenance period.
- B. Keys and Identification: Return all keys and identification materials supplied by Owner for the purpose of site access.

END OF SECTION 02970

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Formwork for cast in place concrete, with shoring, bracing and anchorage.
 - 2. Openings for other work.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Sections include the following:
 - 1. Section 03200 - Concrete Reinforcement.
 - 2. Section 03300 - Cast-in-Place Concrete.
 - 3. Section 04200 - Unit Masonry.
 - 4. Section 05120 - Structural Steel.
 - 5. Supply of mechanical items for placement by this Section.
 - 6. Supply of electrical items for placement by this Section.

1.03 REFERENCES

- A. ACI 301- Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 347 - Recommended Practice For Concrete Formwork.
- D. PS 1 - Construction and Industrial Plywood.

1.04 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to Code requirements; resultant concrete to conform to required shape, line and dimension.
- B. Form, shoring and reshoring design shall be the sole responsibility of the Contractor. All shoring shall be designed by a Civil or Structural Engineer licensed in the State of California.

1.05 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Submit Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

- C. Review of shop drawings is of a general nature only, and responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the construction drawings.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with the tolerances specified in ACI-347, Section 3.3, unless noted otherwise.
- B. Design shoring under direct supervision of the Civil or Structural Engineer responsible for the design.

PART 2 - PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Form Materials: Shall be at the discretion of the Contractor. Forms shall impart a smooth uniform appearance to the concrete without mottles and color variations caused by non-uniform absorption of moisture or chemical reaction.

2.02 FORMWORK ACCESSORIES

- A. Form Ties: Shall be removable or snap-off type with cones. When forms are removed, all metal shall be not less than 1-1/2 inches from the surface and shall not impart fractures, spalls, or other surface defects. Holes from cones shall be patched.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, impair surface finish, bonding or coating.
- C. Corners: Provide 3/4 inch chamfers at all vertical and horizontal edges of beams and columns.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.
- B. Verify that work from other trades has been completed to the point where formwork installation may properly commence.
- C. Verify that the reinforcing steel has been inspected prior to concealing with formwork.

3.02 EARTH FORMS

- A. Earth forms are permitted where adequate tolerances can be achieved.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance

with requirements of ACI 301.

- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams and columns.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Do not run conduits, wires or pipes in concrete unless approved by the Architect. When approved by the Architect, provide pipe sleeves for thermal expansion.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.

- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 347 unless noted otherwise. Tolerances for formed surfaces exposed to view in the completed structure shall conform to Class A as defined in table 3.3.8 of ACI 347.
- B. Forms shall have sufficient rigidity so as not to deflect more than 1/8 inch between supports after the concrete has been placed.

3.08 FORM REMOVAL

- A. Time of form removal shall depend on the strength of the concrete and the curing. The following time periods shall be considered a minimum and may be extended by the Architect:
 - 1. Forms and shoring in formwork used to support the weight of concrete beams or columns shall remain in place until the concrete has reached the minimum concrete strength specified or 21 days minimum.
 - 2. Side forms of slab on grade shall remain in place for 7 days
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Form removal shall be done at uniform time periods for each type of work throughout the job to ensure uniform color and finish.
- D. All forms below ground surface, with all shores and braces, shall be removed before backfilling.

END OF SECTION 03100

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.
- B. Related Sections include the following:
 - 1. Section 03100 Concrete Formwork.
 - 2. Section 03300 Cast-in-Place Concrete.
 - 3. Section 04200 - Unit Masonry.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 315 – Details and Detailing of Concrete Reinforcing.
- C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- D. ASTM A706 – Low Alloy Steel Deformed Bars for Concrete Reinforcement
- E. AWS D1.4 - Structural Welding Code for Reinforcing Steel.

1.04 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Shall be completely detailed, including bending schedules and bending diagrams, and submitted for review. Shop drawings shall show placing details, size and location of reinforcing steel, and any welding to be done. Shop drawings shall clearly specify locations of bars. On elevations of beams and columns locate sleeves that conflict with typical details or reinforcing. Shop drawings shall not be copies of Construction Drawings.
- C. Architectural, structural, mechanical, electrical, and other contract documents shall be reviewed for anchor bolt schedules, location for anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete. Provisions shall be made so that reinforcing steel will not interfere with the placement of such embedded items.
- D. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect.

- E. Review of shop drawings is of a general nature only, and responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the construction drawings.

1.05 DELIVERY AND STORAGE

- A. Reinforcing shall be delivered to site properly bundled and tagged. Store reinforcing steel off the ground and as required to prevent excessive rusting. Protect reinforcing from any coating that will interfere with bond. Do not use damaged or reworked materials.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel:

1. ASTM A615, Grade 60, deformed bar, unless noted otherwise. Grade 40 steel may be used for #4 and smaller ties or stirrups.
2. ASTM A706, deformed bars for moment frame longitudinal reinforcement of columns and beams and where reinforcement is to be welded.
3. Shall be new, free from rust, scale, oil, and dirt.

2.02 ACCESSORIES

- A. Headed Reinforcement: embedment style couplers as an alternate to hooked longitudinal reinforcement in moment frame joints. Lenton Terminator - D6 by Erico Inc. or equal with prior approval of Engineer.
- B. Welded splices and mechanically connected reinforcement shall comply with CBC 1921.2.6. Reinforcing Steel Couplers: Lenton Couplers by Erico Inc. or equal with prior approval of Engineer.
- C. Tie Wire: Minimum 16 gage annealed type.
- D. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- E. Where supports bear on earth, use concrete blocks. For surfaces exposed to view, stainless steel support chairs, spacers, or bolsters shall be used.
- F. The use of wood or organic supports or spacers inside the forms is not permitted.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 301.
- B. Weld reinforcement in accordance with AWS D1.4. As a minimum, use E70 electrodes.
- C. Reinforcing splices not indicated on drawings shall be located at points of minimum stress and approved by the Architect prior to placement.

- D. In case of fabrication errors do not rebend reinforcement in a manner that will damage or weaken the material.

PART 3 - EXECUTION

3.01 PLACEMENT

- A. Reinforcing steel shall be placed in accordance with the Construction Drawings, the reviewed shop drawings, and the requirements of the references. Place, support and secure reinforcement against displacement due to workmen and the placement of concrete. Do not deviate from required position.
- B. Maintain concrete cover around reinforcing as follows unless noted otherwise:

Item	Coverage
Beam Stirrups	1-1/2 inch
Column Ties	1-1/2 inch
Slabs and Concrete Formed Against Earth	3 inches

- C. Obstructions: Where conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing steel, obtain acceptance from the Architect for resolution before placing concrete.
- D. Accommodate placement of formed openings.
- E. Do not displace or damage vapor barriers.
- F. Tying: Push in tie wire so that concrete placement will not force the wire ends to the surface of exposed concrete.
- G. Splicing: Locate splices as specified in the Construction Drawings. Stagger splices in adjacent bars wherever possible.
- H. Field Bending: All reinforcing shall be bent cold. Assure that minimum bend radiuses are maintained. Do not rebend reinforcement within 6 inches of previously bent areas without approval from the Architect. Reinforcing partially embedded in concrete shall not be field bent.

3.02 FIELD QUALITY CONTROL

- A. Schedule inspections with special inspectors and Architect a minimum of 48 hours prior to placing concrete.

END OF SECTION 03200

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Cast-in-place concrete foundations, beams, columns, moment frames, slabs and walls.
- B. Related Sections include the following:
 - 1. Section 03100 - Concrete Formwork.
 - 2. Section 03200 - Concrete Reinforcement.
 - 3. Section 04200 - Unit Masonry.
 - 4. Section 05120 - Structural Steel.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ACI 309 - Guide for Consolidation of Concrete.
- E. ASTM C33 - Concrete Aggregates.
- F. ASTM C94 - Ready-Mixed Concrete.
- G. ASTM C150 - Portland Cement.
- H. ASTM C309 - Liquid Membrane-Forming Compounds.

1.04 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Submit proposed concrete mix designs stamped by a structural or civil engineer currently licensed in the State of California. The submittal should include a history of uses and test reports and product data sheets.
- C. Shop drawings of reinforcing steel.
- D. Submit curing method for review.

1.05 SUBMITTALS AT PROJECT CLOSEOUT

- A. Accurately record actual locations of embedded utilities, and components which are concealed from view. Submit to the owner at project closeout.
- B. All test and inspection reports.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.
- C. Acquire cement and aggregate from same source for all work.
- D. Special Inspections: The following special inspections, as required by Section 1701 of the Uniform Building Code, shall be provided during construction on the following types of work. The contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner. The owner shall bear costs of tests and/or inspections. Re-testing due to defective materials or workmanship will be back charged to the Contractor.
 - 1. Concrete, per Section 1701.5; Inspection of concrete placement and compression tests.
 - 2. Reinforcing Steel, per Section 1701.5.4:2, during placement of reinforcing.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II, and shall be provided by one manufacturer.
- B. Aggregates:
 - 1. Coarse shall conform to ASTM C33 size 57 or 67.
 - 2. Fine shall conform to ASTM C33.
- C. Water: Clean, potable, and not detrimental to concrete.

2.02 ADMIXTURES

- A. No admixtures shall be allowed without written acceptance by the Architect. Admixtures that have a negative impact on concrete finish shall not be used. When more than one admixture is used, admixtures shall be compatible.
- B. Air Entrainment: ASTM C260; “Daravair”, “Micro-Air”, manufactured by W.R. Grace, Master Builders or equal.

2.03 ACCESSORIES

- A. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate,

cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGrout 212 or approved equal.

- B. Epoxy Grout: Two-part epoxy adhesive product that conforms to the requirements of Simpson SET High Strength Epoxy (ICBO ER-5279) by Simpson Strong Tie or equal product with prior written approval of Architect. Installation shall be in strict conformance with the manufacturer's recommendations

2.04 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Addition of water to the mix after leaving the plant is not permitted.
- C. Provide concrete to the following criteria:
 - 1. Compressive Strength (28 day): 4000 psi.
 - 2. Normal Weight Aggregate.
 - 3. Water/Cement Ratio (maximum): 50 percent by weight.
 - 4. Aggregate Size (maximum): 1-1/2 inch.
 - 5. Slump: 4 inches
 - 6. Drying Shrinkage Limit: 0.45 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

- A. Prepare joints in previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify Architect and Special Inspector minimum 48 hours prior to commencement of operations. Do not place concrete until forms and reinforcement as well as other required inspections have occurred and the Special Inspector is present to perform observations and testing during placement.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

- D. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler. Place joint filler to required elevations. Secure to resist movement by wet concrete.
- E. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
- F. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- G. Place concrete continuously between predetermined contraction joints.
- H. Do not interrupt successive placement; do not permit cold joints to occur.
- I. Form contraction joints as detailed on plans. Joints shall be formed immediately after final finishing with an approved "SOFF-Cut" concrete-sawing machine as manufactured by "SOFF-Cut International: Corona, California (909) 272-2330. Avoid dislodging aggregates. Unless otherwise indicated or directed, the joints shall be 1/8 inch wide and 1 inch deep. Do not use zip-strips. Saw contraction joints to true alignment with "SOFF-Cut" concrete-sawing machines adequate in number and power and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut as the concrete has hardened sufficiently to permit walking on the slab, and as recommended by the saw manufacturer. Unless otherwise approved, saw joints in the sequence of concrete placement. Remove cutting debris. Saw cuts shall be made in accordance with manufacturer's instructions.
- J. Screed slabs on grades shown, maintaining surface to tolerance of 1/4 inch maximum in 10 feet.

3.04 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with medium broom finish. Coordinate with Architect.
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.05 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 308.
- D. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

3.06 FIELD QUALITY CONTROL

- A. Provide free access to Work and cooperate with Owner, Architect and Structural Engineer.

- B. Submit proposed mix design of each class of concrete to special inspection and testing firm for review prior to commencement of Work.
- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- E. At a minimum one slump test will be taken for each set of test cylinders taken.

3.07 PATCHING

- A. Allow Architect and Structural Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect upon discovery.
- C. Patch imperfections in accordance with ACI 301.

3.08 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
- D. No additional compensation will be allowed for repair of defective concrete.

END OF SECTION 03300

SECTION 03360

CONCRETE HARDENER AND SLIP RESISTANT FINISHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Non-metallic shake-on mineral-aggregate concrete surface hardener including the following:
 - a. Light-reflective.
 - 2. Non-ferrous shake-on mineral-aggregate for slip-resistant concrete surface finish.
 - 3. Curing and temporary sealing compound for surface hardener
 - 4. Permanent sealing compound for surface hardener finish.
- B. Related Sections: The following Sections contain requirements that may relate to this Section:
 - 1. Division 3 Section "Cast-In-Place Concrete" requirements for concrete mix submittals and procedures for approval.

1.03 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated. Include the following:
 - 1. Manufacturer's precautions in regard to slab concrete mix and additives.
 - 2. Manufacturer's recommended installation procedures used on the Work.
 - 3. Manufacturer's recommended formulation or modification to standard formulation increasing materials in-place light reflectivity to that required in this specification.
- B. Manufacturer's specifications, surface preparation and application instructions, recommendations for curing, temporary sealing, and permanent sealing compounds; and protection and cleaning instructions. Include data substantiating that curing and sealing materials are recommended by hardener compound manufacturer for applications indicated and comply with requirements.
- C. List, provided by installer indicating projects from the last 5 years where they have installed concrete floor hardener systems similar in nature to that specified for this Project.
- D. Certifications: Written certification by concrete floor hardener materials manufacturer indicating the following:

1. That installer has received sufficient training and is approved by manufacturer to install their product.
2. That they have reviewed the concrete mix to which the hardener materials will be applied and that they approve of the mix for application of their product.

E. Minutes of preinstallation conference.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An installer with a minimum of 5 years documented experienced who has completed work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer shall be certified by hardener product manufacturer for installation of their products.
- C. Contractor shall coordinate the location of control and construction joints with the concrete hardener applicator. Joint locations may be determined based upon the tolerances of the apparatus used to place the hardener. Joint spacings shall not exceed 16 feet on center and are shown on Structural Drawings.
- D. Comply with the following codes, standards, and recommended practices.
 1. ACI 301-89 "Specifications for Structural Concrete Buildings". Comply also with provision for Class 5 and 6 Floors.
 2. ACI 302-R-89 "Guide for Concrete Floor and Slab Construction."
 3. ACI 304-R-89: Guide for Measuring, Mixing, Transporting and Placing concrete.
 4. ACI 305-R-91: Hot Weather Concreting.
 5. ACI 306-R-89: Cold Weather Concreting.
 6. ASTM C 308-89: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 7. ASTM C 1315: Standard Specification for Liquid Membrane-Forming Compound having Special Properties for Curing and Sealing Concrete.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- F. Mockups: Build mockups to comply with the following requirements, using materials indicated for completed Work.
 1. Build a portion of the Work to verify selections made under sample Submittals., Construct minimum 100 sq. ft. mockups. Locate where directed by Architect.
 2. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects of materials and workmanship.
 4. Obtain Architect's approval of mockups before proceeding with remaining floor hardened finishes installation.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Approved mockups in an undisturbed condition at the time of Substantial Completion shall become part of the completed Work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
 - 1. Place topping only when ambient temperature and temperature of base slabs are between 50 and 86 deg F.
- B. Do not proceed with application of permanent sealer under any of the following conditions, except with written instruction of manufacturer:
 - a. Ambient temperature is less than 40 deg F.
 - b. Concrete surfaces have cured for less than 28 days.
 - c. Rain or temperatures below 40 deg F are predicted within 24 hours.
 - d. Application is earlier than 24 hours after surfaces have been wet.
 - e. Substrate is frozen or surface temperature is less than 40 deg F.
 - f. Windy condition exists that may cause water repellent to be blown onto surfaces not intended to be coated.
- C. Close areas to traffic during topping and sealer application and, after application, for time period recommended in writing by manufacturer.

1.07 SEQUENCING

- A. Contractor shall coordinate submission of approved cast-in-place concrete mix to concrete hardener finish manufacturer for certified approval and in sufficient time so as not to delay the Work.

PART 2 - PRODUCTS

2.01 CONCRETE FLOOR HARDENER

- A. Mineral-Aggregate Concrete Surface Hardener: Factory-prepared and dry-packaged mixture of graded, non-metallic mineral aggregates, Portland cement and other admixtures, as described by the products specified, which is applied to unset concrete by the shake-on process at the Project site and which will increase the abrasion and chemical resistance of the substantially cured surface of the concrete slab.
 - 1. Light reflective hardener shall be formulated to increase by a minimum of 60 percent the light reflective properties of the floor surface over that of plain gray concrete.

2. Reflectance values for light reflective type hardener shall be submitted in accordance with this Section's Article "Submittals" and shall be determined using the "Known Sample" method. "Known Sample" finish sample shall have a 60 percent light reflective value and shall be used as the basis for determining light reflective value of reflective type surface hardener specified to comply with the reflective value requirements. Luminance shall be measured using an accurate laboratory type instrument.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Light-Reflective Hardener:

- a. Euclid Chemical Company; Surfex Light Reflective.
- b. L & M Construction Chemicals, Inc.; Quartz Plate L.R.
- c. Chemrex Inc.; Mastercron Light Reflective.

2.02 CONCRETE SLIP RESISTANT FINISH

A. Mineral-Aggregate for Slip Resistant Concrete Finish: Factory-prepared and dry-packaged mixture of graded, sharp irregular particles, ranging from large to small which is applied to unset concrete by the shake-on process at the Project site, and which mesh together to increase the slip resistance of the substantially cured surface of the concrete slab.

1. Slip Resistant Flooring Finish:

- a. Euclid Chemical Company; Non-Slip Aggregate.
- b. L & M Construction Chemicals, Inc.; Grip IT/AO.

2.03 APPLICATION AND CURING MATERIALS

A. Monomolecular Film Forming Compound: Manufacturer's recommended liquid compound formulated to control evaporation of concrete slab water and prevent surface shrinkage cracks during application of hardener, and that is compatible with component mix of concrete slab.

B. Clear, Waterborne, Membrane-Forming Curing And Temporary Sealing Compound: Manufacturer's recommended formulation complying with ASTM C 309, Type 1, Class B, 25 percent solids content, minimum; and ASTM C 1315, except for white pigment provisions.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Euclid Chemical Company; Super Aquacare VOX, except provide Kurez DR if recommended by manufacturer for use with permanent sealer.
- b. L & M Construction Chemicals, Inc.; Dress & Seal WB/#30, except provide L&M Cure DR if recommended by manufacturer for use with permanent sealer.
- c. Chemrex Inc.; MasterKure.

2.04 PERMANENT SEALER MATERIAL

- A. Silanes, 40 Percent Solids: Penetrating water repelling sealer. A monomeric compound containing approximately 40 percent alkyltrialkoxysilanes with alcohol, mineral spirits, water, or other proprietary solvent carrier.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Euco-Guard S-40.
 - b. L&M Construction Chemicals, Inc.; Pentane 40.
 - c. Chemrex Inc.; MasterSeal SL 40 VOC.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine concrete substrates as soon as possible after they are poured, with concrete Installer present, for conditions affecting performance of hardener. Proceed with application only after unsatisfactory conditions have been corrected but before concrete slab sets up beyond hardener manufacturer's application recommendations.
- B. Verify that base slabs meet finish and surface profile requirements in Division 3 Section "Cast-in-Place Concrete."
- C. Starting with installation work indicates acceptance of any unsatisfactory surface conditions and hardener installer will be responsible for satisfactory results on finished surfaces.

3.02 HARDENER AND SLIP RESISTANT MATERIAL INSTALLATION

- A. Start surface hardener and non-slip aggregate application in presence of manufacturer's technical representative.
- B. In windy or hot weather apply evaporation control membrane if required and recommended by hardener manufacturer.
- C. Apply shake-on hardener and non-slip aggregate in two applications unless manufacturer recommends otherwise.
- D. Apply first shake to the floated concrete adjacent to forms, and entry-ways, where moisture will be lost first. Apply two-thirds of the specified total shake immediately following floating of total area.
 - 1. Distribute evenly. Material shall be applied at the rate recommended by the manufacturer for heavy duty type of service, but not less than 1 lb. per square foot except as follow:
 - a. Apply non-slip aggregate at the minimum rate of 0.4 lb. per square foot (with cement additive) in one application only.
 - 2. Do not hand throw the shake, except in areas where the machine application is impossible. Where applied by hand, verify 1 lb. per square foot coverage.

3. All hand floating shall be done with Wood Floats. Do not use Magnesium Floats, Bull Floats or Darbies.
- E. Finishing machines with float blades shall be used as soon as shake has absorbed moisture (indicated by darkening of surface). Float just sufficiently to bring moisture from base slab through the shake.
- F. Immediately following the floating of the first shake, apply the remaining one-third of the total specified shake in the same manner and machine float as specified. Surface shall be further compacted by a third mechanical floating if time and setting characteristics of concrete will allow.
 1. Finish and measure surface so gap at any point between topping surface and an unleveled freestanding 10-foot- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/8 inch.
- G. At no time shall water be added to the surface:
 1. As surface further stiffens, as indicated by loss of sheen, it shall be hand or mechanically troweled with blades relatively flat.
 2. All marks, pinholes, shall be removed in the final raised trowel operations.

3.03 FIELD QUALITY CONTROL

- A. During the initial periods of installation, the manufacturer of the surface hardener shall provide at no cost the services of a trained concrete technician. A minimum of 3 days notice shall be given by the Contractor to the surface hardener manufacturer prior to initial use of the product.

3.04 CURING AND TEMPORARY PROTECTION

- A. Begin curing immediately after finishing hardener application and as follows:
 1. After surface had hardened sufficiently so that surface will not be marred by the curing compound application.
 2. When there is no free water on the surface of the slab at the time of curing compound application.
- B. Cure by applying membrane-forming curing compound uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Comply with the requirements of ASTM C 309-74 for minimum moisture retention requirements.
- C. When dry, the slab surface shall be protected from dropping of paint, dirt and other debris by a covering of scuff-proof, non-staining building paper until sealed.
- D. The floor shall remain covered and be kept free of traffic and loads for at least 10 days after their completion. Adequate provision shall be made for maintaining the concrete temperature of 50 degrees F or above during the curing period.

3.05 PREPARATION FOR PERMANENT SEALER

- A. Clean substrate of substances that might interfere with penetration or performance of water repellent sealer. Test for moisture content, according to sealer manufacturer's written instructions, to ensure surface is sufficiently dry.
 - 1. Remove oil, curing compounds, temporary sealers, laitance, and other substances that could prevent adhesion or penetration of sealer.
 - a. Time duration regulating point in time when curing compounds and temporary sealers can be removed is dependent on specific manufacturer and product applied. Some product must be removed prior to a certain number of days after application, whereas others must be removed after a certain number of days after application (published time intervals vary from about 2 weeks to 6 weeks). Comply with manufacturer's recommended requirements.
- B. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent sealers. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of sealer being deposited on surfaces.
- C. Coordination with Sealants: Do not apply water repellent sealer until sealants for joints adjacent to surfaces receiving water-repellent sealer treatment have been installed and cured.
 - 1. Water-repellent sealer work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent sealer, and sealant materials identical to those used in the work.

3.06 APPLICATION OF PERMANENT SEALER

- A. Apply a heavy-saturation spray coating of water repellent sealer on hardened surfaces using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure.
- B. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.07 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative for the following:
 - 1. To inspect and approve initial hardener installation operations, including instructing applicator on the product and application method to be used.
 - 2. To inspect and approve the hardened concrete substrate before application of permanent water repellent sealer and to instruct the applicator on the product and application method to be used.
- B. A minimum of three days notice shall be given by the Contractor to the surface hardener manufacturer prior to initial use of the products.

3.08 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean water repellent sealers from adjoining surfaces and surfaces soiled or damaged by sealer application as work progresses. Repair damage caused by sealer application. Comply with manufacturer's written cleaning instructions.

3.09 REPAIRS

- A. Defective Slab Surface: Repair and patch defective slab surface areas, including areas that have not bonded to concrete substrate.

END OF SECTION 03360

SECTION 03470

TILT-UP PRECAST CONCRETE

PART 1 -

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes tilt-up, site cast concrete wall panels, load bearing, erected from mold to final position; supports, devices, and attachments; perimeter and intermediate joint seals; and grouting under panels.
- B. The Engineer has not been retained to design the wall panels or the floor slab to resist the stresses caused by erection of the wall panels, nor to determine the means and methods to be used for erection and temporary bracing.
- C. It shall be the Contractor's responsibility to erect the panels in a manner that will be safe for personnel and property, and to brace and otherwise protect panels against wind and other forces that may occur during construction and until connections to the permanent structural systems are completed.
- D. It shall be the Contractor's responsibility to ensure that a suitable slab has been prepared to provide for the level finish that has been established within this specification.
- E. It shall be the Contractor's responsibility to coordinate the slab finishing including saw cutting of all joints with the panel forming to minimize the impact to the architectural finish of the panels.
- F. Related Sections include the following:
 - 1. Section 03100 – Concrete Formwork
 - 2. Section 03200 – Concrete Reinforcement
 - 3. Section 03300 - Cast-In-Place Concrete
 - 4. Section 5120 – Structural Steel
 - 5. Section 07920 - Joint Sealants: Caulking of perimeter joint with sealant and backing.
 - 6. Supply of architectural items for placement by this section.
 - 7. Supply of mechanical items for placement by this section.
 - 8. Supply of electrical items for placement by this section.

1.03 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
9. ASTM C33 - Standard Specification for Concrete Aggregates.
10. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
11. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
12. ASTM C150 - Standard Specification for Portland Cement.
13. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
14. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
15. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. SSPC: The Society for Protective Coatings:

1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.04 SUBMITTALS FOR REVIEW

- A. Division 1 Section "Submittal Procedures" for general requirements.
- B. Shop Drawings and Erection Drawings: Indicate panel layout, tilt-up unit locations, configuration, unit identification marks, reinforcement, connection details, support items, temporary bracing, location of lifting devices, dimensions, openings, and relationship to adjacent components.
- C. Design Data: Submit design prepared by a civil or structural engineer currently licensed in the State of California indicating calculations for lifting and erection loadings and stresses. Reinforcing bars shown on project plans do not allow for lifting and erection stresses.
- D. Submit manufacturer's data sheets on proposed materials and accessories.
- E. Submit proposed mix design and reinforcing placing drawings before starting work.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with Federal, State and local codes and regulations having jurisdiction. Where those requirements conflict with this specification, comply with the more stringent provisions.
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.
- C. Perform Work in accordance with ACI 318 and CBC.
- D. Special Inspections: The following special inspections, as required by Section 1701 of the Uniform Building Code, shall be provided during construction on the following types of work. The contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner. The owner shall bear costs of tests and/or inspections. Re-testing due to defective materials or workmanship will be back charged to the Contractor.
 - 1. Concrete, per Section 1701.5; Inspection of concrete placement and compression tests.
 - 2. Bolts and embedded items, per Section 1701.5.2.
 - 3. Reinforcing Steel, per Section 1701.5.4:2, during placement of reinforcing.
- E. Welding: AWS D1.1.
- F. Contractor shall consult with the Project Architect and Owner prior to initiating the project to determine the expectations for the project appearance.

1.06 QUALIFICATIONS

- A. Fabricator: Company specializing in performing Work of this section with minimum five years documented experience.
- B. Welder: Qualified within previous 12 months in accordance with AWS D1.1 and AWS D1.4.

1.07 MOCK-UP

- A. Section 01400 - Quality Requirements: Requirements for mockup.
- B. Construct mock-up, 4 feet long by 4 feet wide, to include: lifting devices, anchor devices, joint and joint seals in center of panel, edge and reveal conditions as detailed on plans.
- C. Locate where directed by Architect or Owner.
- D. Remove mockup when directed by Architect or Owner.

1.08 PRE-INSTALLATION MEETINGS

- A. Division 1 Section "Project Management And Coordination" general requirements for pre-installation meetings.

- B. Convene minimum one week prior to commencing work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Handling Tilt-up Units: Lift units to position, consistent with their shape and design. Lift and support only from support points.
- C. Blocking and Lateral Support During Erection: Clean and non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing, warping, or cracking.
- D. Protect units from staining, chipping, or spalling.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C150, Type II.
- B. Concrete Materials: ASTM C33, water and sand.
- C. Reinforcement: ASTM A615, deformed steel bars, ASTM A706, low-alloy steel deformed.
- D. Air Entrainment Admixture: ASTM C260.
- E. Admixtures: as specified in Section 03300.
- F. Surface Retarder: provide manufacturer's literature for review.
- G. Form Bond Breaker: provide manufacturer's literature for review.
- H. Curing Compound: provide manufacturer's literature for review.
- I. Grout: Non-shrink, minimum 7,000 psi, 28 day strength.

2.02 SUPPORT DEVICES

- A. Connecting and Support Devices: ASTM A36; weldable steel.
- B. Bolts, Nuts, and Washers: ASTM A307.
- C. Anchor Bolts 7 Rods, ASTM F 1554, weldable Grade 55.

2.03 ACCESSORIES

- A. Sealant: Type specified in Division 7 Section "Joint Sealants."

2.04 MIX

- A. Concrete: Provide in accordance with Section 03300.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Division 1 Section “Project Management And Coordination” general requirements for coordination and project conditions.
- B. Verify building structure, anchors, devices, and openings are ready to receive work of this Section.

3.02 PREPARATION

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION - SITE CAST

- A. Maintain environmental records and quality control program during production of tilt-up units. Make records available upon request.
- B. Use rigid molds, constructed to maintain tilt-up units uniform in shape, size and finish, as indicated on Drawings.
- C. Maintain consistent quality during manufacture.
- D. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- E. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items as indicated on Drawings.
- F. Locate hoisting devices to permit removal after erection.
- G. Concrete shall be thoroughly consolidated around reinforcement, around embedded items, and into corners of forms.
- H. Cold joints shall not be permitted in individual site cast tilt-up panels.
- I. Cure units to develop concrete quality, and to minimize appearance blemishes including non-uniformity, staining, or surface cracking.
- J. Minor patching is acceptable, providing structural adequacy and appearance of units is not impaired.]
- K. Design of panels for erection stresses and selection of lifting system and hardware shall be the responsibility of the Contractor.
- L. Minimum strength of panels at time of erection shall be in accordance with the lifting design.

- M. It is recommended that the Contractor take extra test specimens, at their expense, and field cure to verify concrete strength of panels prior to erection.
- N. Erect units without damage to shape or finish. Replace or repair damaged panels as directed by Engineer.
- O. Erect members level and plumb within allowable tolerances.
- P. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- Q. When members require adjustment beyond design or tolerance criteria, discontinue affected work; advise Engineer.
- R. Panels shall be braced in position using a bracing system designed to resist wind and other temporary loads until all structural connections have been made. There shall be a minimum of two braces per panel. Design of bracing shall be the responsibility of the Contractor. Panel bracing connections shall be maintained daily by Contractor to assure tightness.
- S. Contractor's engineer shall provide written notice of when bracing may be removed. Bracing shall not be removed until roof and floor diaphragm is completely installed and welded.
- T. Fasten and weld units in place. Perform welding, including tack welds, in accordance with AWS D1.4. Wait a minimum of 28 days from panel casting before making any panel-to-panel welds.
- U. Touch-up field welds and scratched or damaged surfaces.
- V. Set units evenly on prepared setting pads and proper capacity shims maintaining joint dimension. Grout pack under panels for full bearing or provide additional support until grouting operations are complete.
- W. Exposed Joint Dimension: 3/4 inch.
- X. Patch holes, cut-off anchors, surface defects, and damaged corners to match panel with epoxy/cement paste adhesive in a manner acceptable to the Architect.
- Y. Seal perimeter and intermediate joints in accordance with Section 07920.

3.04 ERECTION TOLERANCES - SITE CAST

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Out of Square: 1/8 inch in 10 feet, non-cumulative.
- C. Variation From Dimensions Indicated on Drawings: Plus or minus 1/4 inch.
- D. Maximum Misalignment of Anchors, Inserts, Openings: 1/2 inch.
- E. Maximum Bowing of Units: Length of bow / 360.
- F. Joint Tolerance: Plus or minus 1/4 inch.

3.05 ADJUSTING

- A. Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Adjust units so joint dimensions are within tolerances.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01700 - Execution Requirements: Protecting installed construction.
- B. Protect units from damage.
- C. Use non-combustible shields during welding operations to protect adjacent Work.

3.07 CRACKED AND DAMAGED CONCRETE PANELS

- A. Panel damage that occurs during erection, cracks readily visible, permanent bowing occurring from erection, and spalls, shall be repaired or replaced to the satisfaction of the Project Architect.
- B. No additional compensation will be allowed for repair of defective concrete.

END OF SECTION 03470

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes all labor, materials, equipment and services necessary for the completion of the masonry work shown on the drawings, including but not limited to.
 - 1. Masonry units.
 - 2. Grout.
 - 3. Mortar.
 - 4. Reinforcing steel.
 - 5. Embedded items.
- B. Related Sections include the following:
 - 1. Section 03300 – Cast-In-Place Concrete.
 - 2. Section 05120 – Structural Steel.

1.03 REFERENCES

- A. ACI 530 – Building Code Requirements for Masonry Structures.

1.04 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Samples: Submit two full size concrete masonry units of each type, including special shapes required to show range of colors, texture, finishes and dimensions.
- C. Certificate: Furnish manufacturer's certification that masonry units furnished meet or exceed the requirements of this specification.
- D. Block and mortar color selection.

1.05 PRODUCT DELIVERY AND HANDLING

- A. Store masonry units above ground on level platforms, which allow air circulation under stacked units.
- B. Cover and protect against wetting prior to use.
- C. Handle units on pallets or flat bed barrows.
- D. Do not permit free discharge from conveyor units or transporting in mortar trays.

1.06 QUALITY ASSURANCE

- A. All work shall conform to the 2001 California Building Code (CBC).
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.
- C. Submit certified test results from a recognized testing laboratory showing that masonry units conform to ASTM C-90. Such tests shall not be more than six months old. Testing required due to lack of certified test results shall be paid for by the Contractor.
- D. Special Inspections: The following special inspections, as required by Section 1701 of the California Building Code, shall be provided during construction on the following types of work. The contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner. The owner shall bear costs of tests and/or inspections. Re-testing due to defective materials or workmanship will be back charged to the Contractor.
 - 1. Masonry, per Section 2105.3.2; Inspection of reinforcing steel and grout placement and prism tests. $F'm = 2,500$ psi.

1.07 PROJECT/SITE CONDITIONS

- A. Cold Weather - Do not place concrete masonry units when the air temperature is below 40 degrees F.
- B. Hot Weather - When ambient air temperature is 80 degrees F or above use mortar and grout within 60 minutes of initial introduction of water to cement.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete masonry units
 - 1. Size: 12" x 8" x 16" and 8" x 8" x 16"
 - 2. Grade: "N."
 - 3. Medium weight.
 - 4. Type I.
 - 5. Minimum unit strength per CBC Table 21-A-D.
 - 6. Color: As selected by Architect from manufacturers full range.
 - 7. Type: Smooth both sides.
- B. Cement for mortar and grout shall be Type II per ASTM C150.
- C. Quicklime shall conform to ASTM C5. Hydrated lime shall conform to ASTM C207. Lime putty may be made from quicklime or hydrated lime.
- D. Sand for masonry mortar shall conform to ASTM C144.
- E. Mortar shall be Type "S," conforming to ASTM C270 and CBC Table 21-A-A, color as selected by Architect from manufacturer full range.

- F. Reinforcing positioners shall be as manufactured by California Masonry Systems, Hayward, California.
 - 1. 1V1H for 8" block with single bar in each direction.
 - 2. 1V2H for 8" block with single vertical bar and double horizontal bars.
 - 3. 2V2H for 12" block.

2.02 REINFORCING STEEL

- A. Reinforcing steel shall be deformed bars per ASTM A615.
 - 1. #4 bar and smaller shall be Grade 40.
 - 2. #5 bar and larger shall be Grade 60.

2.03 GROUT

- A. Grout shall conform to ASTM C476.
- B. Grout shall develop a minimum compressive strength of 2800 psi at 28 days.
- C. Aggregate for grout shall conform to ASTM C404.
- D. Grout shall be sufficiently fluid to insure complete filling of all sections of masonry requiring grout but not to allow segregation of the aggregate. In no case shall the grout contain more than 7 1/2 gallons of water per sack of cement.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lay only dry masonry units.
- B. Use masonry saws to cut and fit masonry units.
- C. Provide 3/4 inch minimum interior clearance between reinforcing steel and concrete block unit or mortar.
- D. Bond: Running bond with vertical joints located at center of masonry units in alternate course below.
- E. Set units plumb, true to line, and with level courses accurately spaced.
- F. Adjust masonry unit to final position while mortar is soft and plastic.
- G. If units are displaced after mortar has stiffened, remove, clean joints and units of mortar and relay with fresh mortar.
- H. When joining fresh masonry to set or partially set masonry construction, clean exposed surface of set masonry & remove loose mortar prior to laying fresh masonry.
- I. If necessary to stop off a horizontal run of masonry, rack back one-half block length in each course.

- J. Do not use toothing to join new masonry to set or partially set masonry when continuing a horizontal run.
- K. Grout ALL cells solid unless noted otherwise on drawings. Grout spaces must be free of mortar droppings or other foreign materials.
- L. The basic construction method shall be:
 - 1. Block shall be laid up not to exceed 16 inches high at any one time.
 - 2. Grouting shall be done every vertical 4'-0" and shall be stopped 1-1/2 inch below top of block for a key at grout joints.
 - 3. Vertical cells shall have vertical alignments to maintain a continuous unobstructed cell area of not less than 2 inches by 3 inches.
 - 4. Lay up blocks at openings accurately to jigs constructed of wood or steel framing.
 - 5. Rod each cell during grouting to insure complete filling of all cells.
 - 6. No vertical construction joints will be permitted in walls.
 - 7. All anchor rods, embeded items, etc., inserted in wall shall be solid grouted in place.
 - 8. All reinforcing shall be fully embedded in grout. All steel shall be wired together and firmly held in position. Reinforcing bars shall be held in location with reinforcing positioners at 4'-0" maximum.
 - 9. Where cracks occur in mortar joints, rake out and replace.
 - 10. Keep all block cleaned as work progresses and thoroughly clean upon completion by using a steel fiber brush and clear, cold water.

3.02 PROTECTION OF WORK

- A. Protect sills, ledges and offsets from mortar drippings or other damage during construction.
- B. Remove misplaced mortar or grout immediately.
- C. Cover top of wall with non-staining waterproof coverings when work is not in progress.
- D. Provide minimum 2 foot overhang of protective covering each side of wall and securely anchor.
- E. Protect face materials against staining.

3.03 MORTAR BEDS

- A. Hollow Units:
 - 1. Lay with full mortar coverage on horizontal and vertical face shells.
 - 2. Provide full mortar coverage on horizontal and vertical face shells and webs in all courses.
 - 3. Starting course on slabs on grade.

3.04 JOINTS

A. Horizontal and Vertical Face Joints:

1. Nominal thickness: 3/8 in.
2. Construct uniform joints.
3. Shove vertical joints tight.
4. Strike joints flush in surfaces to be plastered, covered with other masonry, or at other surface applied finish other than paint.
5. Point joints tight in unparged masonry below ground.
6. Tool joints in exposed or to be painted surfaces when thumbprint hard with concave jointer.
7. Remove mortar protruding into cells or cavities to be reinforced or filled.

3.05 FIELD QUALITY CONTROL

- A. Discharge of concrete shall be completed within 90 minutes, or before 300 drum revolutions, whichever comes first, after the introduction of water to the cement.
- B. The testing laboratory shall take and test a set of three prisms in accordance with ASTM E 447 for each 5,000 square feet of wall area, but not less than one set of three masonry prisms for the project.
- C. The testing laboratory shall take and test one sample of grout and mortar on three successive working days in accordance with ASTM C 1019 and ASTM C 780 respectively.
- D. Tests of aggregates shall be required to ensure conformance with mix design. Suitability tests of aggregates shall be required as determined by the Testing Laboratory.
- E. Samples of cement shall be provided to the Testing Laboratory for testing.
- F. Proof of batch plant weigh master certification shall be required.

END OF SECTION 04200

SECTION 05120
STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Provide structural steel for building construction including sub-framing units which are part of the general framing system. Include anchors, bases, bearing plates, bracing, lintels when part of structural framing, and detail fittings.
- B. Related Sections include the following:
 - 1. Section 03300 – Cast-In-Place Concrete.
 - 2. Section 04200 – Unit Masonry.
 - 3. Section 05200 – Steel Joists.
 - 4. Section 05310 – Steel Deck.

1.03 REFERENCES

- A. ASTM A36A36M – Structural Steel
- B. ASTM A307 – Carbon Steel Externally Threaded Standard Fasteners.
- C. ASTM A500 – Cold Form Welded and Seamless Carbon Steel Structural Tubing
- D. AWS D1.1 – Structural Welding Code.
- E. SSPC – Painting Manual

1.04 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Submit to the Architect detailed shop drawings. Shop drawings shall be drawn to scale. Changes to the Construction drawings shall be noted. Structural steel shall not be fabricated or erected before the Architect has reviewed the shop drawings.
- C. Certified material test reports (mill test) for all structural steel.
- D. Manufacturer's Certifications and product data sheets for all welding filler metal (electrodes).
- E. Welding Procedure Specifications (WPS).

1.05 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Steel fabricators shall be registered and pre-approved by the Building Official.
- C. Visual inspection of welding shall be the primary method to confirm that the procedures, materials, and workmanship incorporated in construction are those that have been specified and approved for the project. Visual inspection shall be conducted by qualified personnel, in accordance with a written practice. Nondestructive testing of welds in conformance with AWS D1.1 shall serve as a backup, but shall not serve to replace visual inspection. All complete and partial penetration welds shall be tested using approved nondestructive methods conforming to AWS D1.1. When welds of the continuity plate to the "k-area" of the column occur, the "k-area" adjacent to the welds shall be inspected using approved non-destructive methods.
- D. Special Inspections: Per Section 1701.5 and 1701.7 of the Uniform Building Code:
 - 1. All field welding.
 - 2. Visual inspection of shop welding performed by approved Fabricator using certified Welders with appropriate documentation.
 - 3. All welding inspectors shall be trained, certified by the Building Official and thoroughly experienced in inspecting welding operations, and qualified in accordance with AWS D1.1.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wide Flange Sections: ASTM A992, Grade 50.
- B. Wide Flange Column Base Plates, Continuity Plates, and Doubler Plates: ASTM A572, Grade 50.
- C. Other shapes, plates and bars: ASTM A 36.
- D. Pipe Columns:
 - 1. $t < 0.625$ inch: ASTM A500.
 - 2. $t \geq 0.625$ inch: ASTM 53 type E or S.
- E. Steel Tubing: ASTM A500 grade B.
- F. Anchor rods and threaded rods: ASTM F1554
- G. High strength threaded fasteners: ASTM A325
- H. Welding: AWS D1.1. FEMA 350.
- I. Complete joint penetration groove welds shall be made with a filler metal that has a minimum Charpy V-notch toughness of 20 ft-lbs at minus 20 degrees Fahrenheit, as

determined by AWS classification or manufacturer certification.

- J. Shop finish for interior exposed structural steel: SSPC SP-6 cleaning; Tnemec Series 37 Chem-Prime, universal rust inhibitive primer, compatible with epoxy & urethane top coats as specified in painting section 09900.
- K. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGrout 212 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with AISC codes and specifications, and with AWS "Structural Welding Code".
- B. Secure field measurements required for proper and adequate fabrication and installation of the work.
- C. Complete penetration moment frame welding requirements:
 - 1. Welds shall be terminated at the end of a joint in a manner that will ensure sound welds. Whenever necessary this shall be done by use of weld tabs, also called extension bars or run off tabs. Weld tabs shall extend beyond the edge of the joint a distance equal to a minimum of the part thickness, but not less than 1 inch. Weld tabs shall meet the requirements of AWS D1.1, Section 5.31. Weld tabs used at beam flange connections shall be removed and the ends of the welds shall provide a smooth transition, free of notches and sharp corners. No weld dams are allowed.
 - 2. After full penetration welding, the backing bar is to be removed, the weld root inspected and tested for imperfections, which if found, are to be removed by backgouging to sound material and cleaned by grinding. The backgouged area is to be welded and a fillet weld shall be applied to reinforce the joint. The size of the reinforcing fillet weld shall be a minimum of 5/16" or the root opening plus 1/16", whichever is larger. The reinforcing fillet weld need not be ground.
 - 3. To assure the proper amperage and voltage of the welding process, the use of a hand held calibrated amp and voltmeter shall be used. The fabricator, erector and the inspectors shall use this equipment. Amperage and voltage shall be measured at the arc with this equipment. Travel speed and electrode stick out shall be verified to be in compliance with the electrode manufacturer's recommendations.
 - 4. The maximum preheat and maximum interpass temperature permitted is 550 degrees F, measured at a distance of 1 in. from the point of arc initiation.
- D. When fabricating beams, place natural camber up.
- E. All bolted connections shall have a minimum of two bolts, unless shown otherwise.
- F. Minimum size of bolts for structural steel connections shall be 5/8" diameter except when otherwise shown or noted.
- G. Provide beveled washers on all connections to sloping flanges of I sections and channels.

- H. When minimum AISC fillet weld thickness requirement exceeds welds shown on details, provide minimum AISC weld.
- I. After fabrication, all steel shall be cleaned free of rust, loose mill, scale and oil.
- J. The Contractor shall be responsible for the control of all erection procedures and sequences including but not limited to temperature differentials and weld shrinkage.
- K. Structural elements having fabrication or erection errors or which do not satisfy tolerance limits shall be repaired at no additional expense to owner. Submit drawings showing reasons for, and details of, proposed corrective work for approval by the Architect prior to performing corrective work.
- L. There shall be no field cutting of structural steel members with out prior approval of the Architect.
- M. Architecturally exposed steel: Fabricate with special care using materials selected for best appearance. Store materials off ground and keep clean. Cut, fit and assemble work with surfaces smooth, square and with complete contact at joints. Set cambers up. Weld all work continuously; grind smooth and flush to make seams invisible after priming. Prepare surfaces to comply with SSPC SP-6; apply prime coat within 24 hours after cleaning.
- N. Touch-up field welds and abraded areas with shop primer.
- O. Expansion anchors to be proof tested after installation.

END OF SECTION 05120

SECTION 05200

STEEL JOISTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Provide steel joists for roof construction.
 - a. Open web steel joists: K-series.
 - b. Longspan steel joists: LH-series.
 - c. Required permanent bracing.
- B. Related Sections include the following:
 - 1. Division 5 Section – Structural Steel.
 - 2. Division 5 Section – Steel Deck.
 - 3. Division 9 Sections – Painting.

1.03 REFERENCES

- A. ASTM A36/A36M – Structural Steel.
- B. SJI (Steel Joist Institute) - Specifications, Load tables, and Weight Tables for Steel Joists and Joist Girders.
- C. AWS D1.1 - Structural Welding Code.
- D. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality

1.04 SUBMITTALS FOR REVIEW

- A. Division 1 Section “Submittals Procedures” for general requirements.
- B. Submit to the Structural Engineer, the complete design calculations and shop drawings showing the member layout, member forces, member stresses, joint deflections and required permanent bracing. The joist design shall be under the supervision of a Civil or Structural Engineer registered in the State of California, and the calculations and shop drawings shall bear his seal and signature. The submittal shall be stamped reviewed by the Structural Engineer prior to fabrication.

1.05 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with

manufacturer's instructions.

- B. Special Inspections: Per Section 1701.5 and 1701.7 of the Uniform Building Code.
 - 1. All field welding.
 - 2. Visual inspection of shop welding performed by approved Fabricator using certified Welders with appropriate documentation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel: Conforming to Steel Joist Institute specifications.
- B. Steel Joists: Shall be designed for the loads specified on the construction drawings.
- C. Shop finish: Steel Structures Painting Council Specification 15-68, Type I - red oxide.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fabricate and install joists in compliance with SJI requirements and recommendations. Shop primer shall be compatible with finish paint specified in painting section 09900.
- B. Coordinate installation of anchor bolts with other work as necessary. Place joists and bridging simultaneously; align work and weld into place in accordance with SJI specifications, & joist manufacturers recommendations. Grout plates as required for sound bearing.
- C. Touch-up damaged coatings using same primer as shop painting.

END OF SECTION 05200

SECTION 05310

STEEL DECK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Provide steel roof deck and required accessories for roof construction.
- B. Related Sections include the following:
 - 1. Section 05120 –Structural Steel.
 - 2. Section 05200 – Steel Joists.

1.03 REFERENCES

- A. AISI – Specification for the Design of Cold-Formed Steel.
- B. AWS D1.1 – Structural Welding Code.
- C. ICBO Evaluation Report ER-2078P.
- D. SSPC – Painting Manual

1.04 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Submit to Structural Engineer, shop drawings showing deck layout, framing, and supports, with dimensions and details of accessories.

1.05 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Special Inspections: Per Section 1701.5 and 1701.7 of the Uniform Building Code.
 - 1. All field welding.
 - 2. Visual inspection of shop welding performed by approved Fabricator using certified Welders with appropriate documentation.

1.06 PERFORMANCE REQUIREMENTS

- A. Diaphragm Shear Capacity: The gage and attachment of the deck is designed to provide a diaphragm shear capacity in accordance with Evaluation Report ER-2078P of the International Conference of Building Officials.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Do not bend or mar decking.
- B. Store off ground with one end elevated for drainage.
- C. Protect from weather.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel: ASTM A 653 SS Designation Grade 33, Minimum Yield 38 ksi.
 - 1. Zinc coated per ASTM A653, G60.
 - 2. Factory Prime Painted Grey: rust inhibitive light gray primer.

2.02 FABRICATION

- A. Form deck units in lengths to span or more supports, with butted or 2" nested end laps and interlocking side laps formed with standing seam allowing button punch connection.
- B. Roof deck units: Provide deck configurations as manufactured by VERCO as follows:
 - 1. Type HSB-36, 18 gage, 36" wide, 1-1/2" deep having minimum $I=.302 \text{ in}^4$, $S=.335 \text{ in}^3$.

2.03 ACCESSORIES

- A. Metal Accessories: Same gage as decking except where noted or specified to be heavier material on drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Check supporting structure for correct layout and alignment. Verify that surfaces to receive roof deck are free of debris. Notify Structural Engineer of any discrepancies or defects prior to proceeding with work.
- B. Install roof deck units and accessories in accordance with approved shop drawings.
- C. Placing Roof Deck Units:
 - 1. Position on supporting steel framework and adjust to final position with ends

- bearing minimum two inches on supporting members.
2. Place units end to end before permanently fastening.
3. Align ribs over entire length of run.

D. Fastening Deck Units:

1. Secure to supporting members with $1/2$ in effective diameter spot welds.
2. Weld or button punch at each support and connect side laps as shown on structural drawings.
3. Comply with AWS requirements and procedures for welding sheet steel in structures.

3.02 PROTECTION

- A. Do not use deck units for storage or working platforms until permanently secured in position.
- B. Construction loads must not exceed carrying capacity of deck.

END OF SECTION 05310

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

1. Steel framing and supports for operable partitions.
2. Steel framing and supports for overhead doors and openings (AESS).
3. Steel framing and supports for countertops
 - a. Concealed in partition walls.
 - b. Exposed on masonry walls.
4. Miscellaneous steel framing and supports for applications including the following:
 - a. Mechanical and electrical equipment.
 - b. Lateral support angels for heads of masonry walls.
 - c. Connection and anchorages not supporting structural steel.
 - d. Applications where framing and supports are not specified in other Sections.
5. Loose bearing and leveling plates, except units indicated to support structural steel.
6. Steel weld plates and angles for casting into concrete including applications where plates and angles not specified in other Sections.
7. Miscellaneous steel trim including the following:
 - a. Perimeter edge angles at concrete slab and deck pits.
 - b. Corner and endwall guards attached to masonry walls.
8. Metal roof hatch access ladders.
9. Metal pipe bollards.
10. Pipe guards.

- B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, wedge-type inserts and loose bearing and leveling plates indicated to be cast into concrete or built into unit masonry.

- C. Related Sections include the following:

1. Division 2 Section "Ornamental Metal Fences And Gates" for gate panels and frames fabricated from steel shapes, bars and sheet.
2. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.

3. Division 4 Section "Unit Masonry Assemblies" for installing loose bearing plates, anchor bolts, and other items indicated to be built into unit masonry.
4. Division 5 Section "Structural Steel" for units including the following:
 - a. Columns, beams, girders.
 - b. Bracing at clerestories.
 - c. Metal canopies.
 - d. Loose bearing and leveling plates supporting structural steel.
5. Division 5 Section "Pipe and Tube Railings."
6. Division 5 Section "Gratings."
7. Division 9 Section "High Performance Exterior Coatings" for materials and procedures for coating AESS.
8. Division 11 Section "Fabricated Equipment" for units fabricated from metal.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.04 SUBMITTALS

- A. Product Data: For the following:
 1. Paint products.
 2. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 2. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 1. AWS D1.1, "Structural Welding Code--Steel."
 2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.07 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Steel complying with ASTM A 1008/A 1008M, commercial steel, Type B; 0.0528-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.

2.03 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633,

Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.04 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
 - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Available Products:
 - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
 - b. Carboline Company; Carbozinc 621.
 - c. ICI Devoe Coatings; Catha-Coat 313.
 - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
 - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
 - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
 - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.05 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.06 STEEL FRAMING AND SUPPORTS FOR OPERABLE PARTITIONS

- A. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- B. Prime with universal shop primer after fabrication.

2.07 STEEL FRAMING AND SUPPORTS FOR OVERHEAD DOORS AND OPENINGS

- A. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated on Drawings and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 1. Provide opening frames with integrally welded steel strap anchors for embedding in masonry construction.
 - a. Furnish inserts if units are installed after masonry is placed.
- B. Prime framing and supports with zinc-rich primer.

2.08 STEEL FRAMING AND SUPPORTS FOR COUNTERTOPS

- A. Fabricate "L" shaped steel tube weldments from two 24-inch lengths of 2-inch square, 3/16-inch wall steel tubes. Attached tubes, end to side, at 90-degree angle; butt weld joint all around.

1. Provide longer tube leg if indicated on Architectural Drawings.
2. For tubes exposed to view, cap ends with 1/8 minimum thick plate or bar stock.

B. Prime with universal shop primer after fabrication.

2.09 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for the following:

1. Mechanical and electrical equipment.
2. Lateral support angels for heads of masonry walls.
3. Connection and anchorages not supporting structural steel.
4. Applications where framing and supports are not specified in other Sections but are needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts if units are installed after concrete is placed.

C. Finish:

1. For framing and supports exposed to exterior and located in Bus Wash M101 provide one of the following:
 - a. Units to remain Unpainted: Galvanize after fabrication.
 - b. Units to be Field Painted: Zinc-rich primer after fabrication.
2. For framing and supports exposed to interior provide universal shop primer, unless indicated otherwise..

2.10 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.

2.11 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.12 PERIMETER EDGE ANGLES

A. Fabricate units from steel shapes, plates, and bars of profiles shown on Drawings with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize after fabrication.

2.13 CORNER AND ENDWALL GUARDS

- A. Fabricate units from steel shapes of profiles shown on Drawings, with smooth exposed edges. Fabricate guards with no splices.
- B. Provide with integrally welded steel strap anchors for embedding in masonry construction.
- C. Prime with zinc-rich primer.

2.14 MISCELLANEOUS STEEL TRIM

- A. Fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Finish:
 - 1. Galvanize steel trim after fabrication at the following locations:
 - a. Units exposed to exterior.
 - b. Units cast into interior concrete slabs.
 - c. Units located in Bus Wash M101.
 - d. Units to remain Unpainted.
 - 2. Prime steel trim exposed to interior with zinc-rich primer after fabrication at the following locations:
 - a. Units to be field painted:

2.15 METAL ROOF HATCH ACCESS LADDERS

- A. General:
 - 1. Comply with ANSI A14.3, unless otherwise indicated.
 - 2. Space siderails as indicated on Drawings.
 - 3. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted brackets, made from same metal as ladder.

B. Components and Fabrication:

1. Siderails: Continuous, steel flat bars, with eased edges. Size as indicated on Drawings.
2. Rungs: Round steel bars. Size as indicated on Drawings.
3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
4. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

C. Prime ladders including brackets and fasteners, with zinc-rich primer.

2.16 METAL PIPE BOLLARDS

- A. Fabricate metal bollards from round Schedule 40 galvanized steel pipe or galvanize after fabrication.
- B. Diameter: As indicated on Drawings.

2.17 PIPE GUARDS

- A. Fabricate pipe guards from 3/8-inch- thick by 12-inch- wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.
- B. Galvanize pipe guards after fabrication.

2.18 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.19 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint

Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.03 INSTALLING STEEL FRAMING AND SUPPORTS FOR COUNTERTOPS

- A. For Units Concealed In Partitions Wall: Anchor vertical leg to cold-formed metal stud framing using either of following methods:
 - 1. Intermittent welds, 2-inches long at 12-inches o.c. maximum, both sides of tube.
 - 2. Fasten with 1/4-20 self-drilling, self-tapping screw; Hilti, Kwik-Flex or pre-approved equal, at 6-inches o.c. maximum in rows staggered at 1-inch o.c. minimum. Insert screw from direction of thinner material to thicker material.

3. Install supports at 32-inches o.c. maximum. Coordinate location with metal stud framing, sinks and other counter penetrations.

B. For Units Surface Mounted to Masonry:

1. Anchor vertical leg to face of concrete unit masonry wall using a minimum of three 3/8 inch dia. expansion anchors located no greater than 4 inches from top of leg and no greater than 12 inches o.c. for remaining portion of leg.
 - a. Embed anchor bolts at least 4 inches in concrete unit masonry.
 - b. Install supports only at unit masonry with fully grouted and reinforced cells.
2. Install supports at 32-inches o.c. maximum.
3. Coordinate location with sinks and other counter penetrations.

3.04 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.05 INSTALLING METAL PIPE BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.06 INSTALLING PIPE GUARDS

- A. Provide pipe guards at exposed vertical pipes in maintenance building where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard. Mount pipe guards with top edge 26 inches above driving surface.

3.07 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

SECTION 05511

METAL STAIRS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following shop fabricated assemblies:
 - 1. Steel stairs with steel floor plate (checker plate) platforms, treads and closed risers.
 - 2. Handrails and railings attached to metal stairs.
 - 3. Handrails attached to walls adjacent to metal stairs.
- B. Related Sections include the following:
 - 1. Division 5 Section "Pipe and Tube Railings" for pipe and tube handrails and railings not attached to metal stairs or to walls adjacent to metal stairs.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.
 - 1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load as follows or a concentrated load of 300 lbs. on an area of 4 sq. in., whichever produces the greater stress.
 - 2. Stair Framing: Stringers capable of withstanding stresses resulting from uniform loads specified above in addition to stresses resulting from railing system loads.
 - 3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbs. applied at any point and in any direction.
 - b. Uniform load of 50 lbs./ft. applied horizontally and concurrently with uniform load of 100 lbs./ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbs. applied at any point and in any direction.
 - b. Uniform load of 50 lbs./ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbs. applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
 - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

1.04 SUBMITTALS

- A. Product Data: For metal stairs and the following:
 1. Steel floor plate (checker plate).
 2. Paint products.
 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.
- C. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. NAAMM Standards: Comply with NAAMM Stair and Railing Standards indicated in Part 2 Article "Fabrication, General."

1.06 COORDINATION

- A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 FERROUS METALS

- A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- D. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- E. Rolled-Steel Floor Plate (Checker Plate): ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- F. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.
- G. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569; or structural quality, complying with ASTM A 570, Grade 30, unless another grade is required by design loads.
- H. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
- I. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
- J. Handrail Brackets: Cast malleable iron. Provide model #4595; J.G. Braun Architectural Metals or approved equal.
- K. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.02 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Machine Screws: ASME B18.6.3.
- D. Lag Bolts: ASME B18.2.1.
- E. Plain Washers: Round, carbon steel, ASME B18.22.1.
- F. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material:
 - a. At Interior Locations Above Grade Level: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - b. At Exterior Locations and Interior Locations at Grade Level or Below: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.03 PAINT

- A. Shop Primer for Ferrous Metal:
 - 1. Provide primers complying with applicable requirements of Division 9 Section "Painting" for where indicated.
 - 2. Organic zinc-rich primer, complying with Steel Structures Painting Manual, Volume 2, Systems And Specifications, SSPC-Paint 20 and compatible with topcoat.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Carboline 621; Carboline Company.
 - 2) Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
 - 3) Tneme-Zinc 90-97; Tnemec Company, Inc.
- B. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.04 GROUT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.05 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, handrails, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
- B. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - a. Cope and miter joints at stair stringers.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- C. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated.
 - 1. Service Class: At Stairs M001 and M002.
 - 2. Industrial Class: At following locations:
 - a. Stairs M003, M004, and M005
 - b. Stair at CNG Fuel System Repair Bay Mezzanine.
- D. NAAMM Railing Standard: Comply with NAAMM AMP 521-95, "Pipe Railing Systems Manual," for Type of railing designated.
 - 1. Type 3: At Stair M001 and M002.
 - 2. Type 4: At following locations:
 - a. Stairs M003, M004, and M005
 - b. Stair at CNG Fuel System Repair Bay Mezzanine.
- E. Shop Assembly: Preassemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- F. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.
- G. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

H. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously, unless otherwise indicated.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

J. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.06 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate stringers of structural-steel channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

1. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Steel Floor Plate Treads, Risers, and Platforms for Stairs with Floor Plate Platforms, Treads and Closed Risers: Form to configurations shown from raised-pattern steel floor plate of thickness necessary to support indicated loads, but not less than 1/4 inch.

1. Steel Sheet: Uncoated, hot-rolled steel sheet.
2. Form treads with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and weld treads to brackets.
3. Close risers with Galvanized steel sheet, unless otherwise indicated.
4. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
5. Shape metal pans to include nosing integral with riser.
6. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.

2.07 STEEL TUBE HANDRAILS AND RAILINGS

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Configuration for Stairs with Closed Risers: 1-1/2 x 1-1/2 x 1/4 inch steel angle

railings with perforated metal infill panels. Space as indicated on Drawings.

- a. Pattern for infill panels: 1/4 inch diameter, 3/8 inch staggered centers, 40 percent open area, 16 gage.
2. Configuration for Stairs with Open Risers: 1-1/2-inch OD top, bottom, and intermediate rails. Space intermediate rails not more than 21 inches clear.
- B. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
 1. At tee and cross intersections, cope ends of intersecting members to fit contour of tube to which end is joined, and weld all around.
- C. Form changes in direction of handrails and rails as follows:
 1. As detailed.
 2. Where not detailed by one of the following methods:
 - a. By miter cut for joints changing direction vertically.
 - b. By bending for joints changing direction horizontally and for compound curves.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of handrail and railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 1. Connect railing posts to stair framing by direct welding, unless otherwise indicated.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- I. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
- J. For nongalvanized handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.08 FINISHES

- A. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs and railings after assembly and as follows:
 - 1. Shop prime the following to comply with applicable requirements in Division 9 Section "Painting:" Stairs M001, M003, and stair at CNG Fuel System Repair Bay Mezzanine.
 - 2. Shop prime the following with organic zinc-rich primer: Stairs M004 and M005.
 - a. Organic zinc-rich primed assemblies shall be allowed to cure for a minimum of one week prior to finish coating with paints specified in Division 9 Section "Painting."
 - 3. Galvanize the following: Stair M002.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strips 0.0299 inch thick and heavier.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
 - 3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed products:
 - 1. Surfaces Receiving Zinc Rich Primer: Exteriors (SSPC Zone 1B); SSPC SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Surfaces Receiving Alkyd Primer: Interiors (SSPC Zone 1A); SSPC SP 3, "Power Tool Cleaning."
- E. Apply shop primer to prepared surfaces of metal stair components, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Do not apply primer to galvanized surfaces.
 - 2. Shop paint all steel with primer meeting requirements of Part 2 Article "Paint."

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- F. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Corrosion Protection: Coat concealed surfaces of steel that will come into contact dissimilar metals, including aluminum, with a heavy coat of bituminous paint.

3.02 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonmetallic, nonshrink grout, unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 INSTALLING STEEL TUBE RAILINGS AND HANDRAILS

- A. Adjust handrails and railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
 - 1. Anchor posts to steel by welding directly to steel supporting members.
 - 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets

to building construction as follows:

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
3. For hollow masonry anchorage, use toggle bolts.
4. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.04 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05511

SECTION 05521

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following shop fabricated steel pipe, tube and chain railing assemblies not included with metal stairs:
 - 1. Handrails.
 - 2. Guardrails
 - a. Fixed.
 - b. Removable.
 - 3. Chain closures.
 - 4. Gates in railings.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Stairs" for steel pipe handrails and railings included with metal stairs.

1.03 PERFORMANCE REQUIREMENTS

- A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
- B. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
- C. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- D. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
 - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- E. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS

- A. Product Data: For the following:
1. Grout and anchoring cement.
 2. Paint products
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
- C. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

- B. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

1.06 STORAGE

- A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.09 SCHEDULING

- A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFCO Steel
 - 2. American Metal Works, Inc.
 - 3. American Stair Corp., Inc.
 - 4. National Stair & Rail, Inc.
 - 5. Sharon Companies, Ltd. (The).
 - 6. Zimmerman Metals, Inc.

2.02 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

- B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
- C. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:
 - 1. Black finish, unless otherwise indicated.
 - 2. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.
- D. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
- E. Steel Plates, Shapes, and Bars: ASTM A 36.
- F. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
- G. Handrail Brackets: Cast malleable iron. Provide model #4595; J.G. Braun Architectural Metals or approved equal.
- H. Miscellaneous Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- I. Gate Hinges: Extra heavy duty, full service, 5-knuckle, plain steel hinges with non-removable fast-spun pins, no hole construction and non-swaged for weld-on application, 6 X 6 size; Stanley; #850 Series or equal.
- J. Gate Locking Hardware:
 - 1. Bottom Lock: Heavy duty steel cane bolt, 18-inches long by 1/4-inch dia. rod minimum.
 - 2. Top Lock: Steel loop latch design to be permanently attached to top of vertical post on guardrail (or one gate in pair) and swing over and securely loop around vertical post of gate (or other gate in pair) so as to securely hold gate to guardrail (or pair of gates) in closed position. Drill holes for insertion of pad lock.

2.03 WELDING MATERIALS, FASTENERS, AND ANCHORS

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
- C. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- D. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

- E. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for handrails and railings indicated.
- F. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- G. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Cast-in-place anchors.
 - 2. Expansion anchors.

2.04 PAINT

- A. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with Steel Structures Painting Manual, Volume 2, Systems And Specifications, SSPC-Paint 20 and compatible with topcoat.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carboline 621; Carboline Company.
 - b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
 - c. Tneme-Zinc 90-97; Tnemec Company, Inc.
 - 2. Organic zinc-rich primed assemblies shall be allowed to cure for a minimum of one week prior to finish coating with paints specified in Division 9 Section "Painting."
- B. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- B. Interior Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

2.06 FABRICATION

- A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

1. All railings designed for use as handrails shall be 1-1/2-inch o.d. round unless indicated otherwise on Drawings.
- B. NAAMM Railing Standard: Comply with NAAMM AMP 521-95, "Pipe Railing Systems Manual," for Type 1 railing.
- C. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- D. Form changes in direction of railing members as follows:
 1. As detailed.
 2. Where not detailed by one of the following methods:
 - a. By miter cut for joints changing direction vertically.
 - b. By bending for joints changing direction horizontally and for compound curves.
- E. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- F. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
- H. Gate Hinges: Install two hinges minimum per gate. Space 8-inches from bottom and top of gate. Install additional hinges as required to limit intermediate spacing at not more than 24-inches o.c.
- I. Gate Locking Hardware: Install one bottom lock on each gate. Install one top lock on each single or pair of gates.
- J. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

- K. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.
- L. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- M. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- N. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- O. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- P. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- Q. Fabricate joints that will be exposed to weather in a watertight manner.
- R. Close exposed ends of handrail and railing members with prefabricated end fittings.
- S. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.
- T. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
- U. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Provide exposed fasteners with finish matching appearance, including color and texture, of handrails and railings.

2.08 STEEL FINISHES

- A. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."
- C. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Shop paint all steel with primer meeting requirements of Part 2 Article "Paint."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.02 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of steel that will come into contact dissimilar metals, including aluminum, with a heavy coat of bituminous paint.
- D. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.03 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.04 ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
 - 1. Nonshrink, nonmetallic grout or anchoring cement.
- B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch build-up, sloped away from post.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.05 ANCHORING RAILING ENDS

- A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
- C. Weld flanges to railing ends.

3.06 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 3. For hollow masonry anchorage, use toggle bolts.

4. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.07 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

3.08 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

SECTION 05522

HEAVY DUTY MODULAR RAILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following shop fabricated steel pipe, tube and chain railing assemblies not included with metal stairs:
 - 1. Heavy duty railing systems
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Stairs" for steel pipe handrails and railings included with metal stairs.
 - 2. Division 5 Section "Pipe and Tube Railings" for handrails and guardrails not described in this section.

1.03 PERFORMANCE REQUIREMENTS

- A. General: In engineering heavy duty railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
- B. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
- C. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- D. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

- a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- E. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Grout and anchoring cement.
 - 2. Paint products
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
- C. For installed railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- B. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

1.06 STORAGE

- A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.09 SCHEDULING

- A. Schedule installation so railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Subject to the requirements of this specification, provide Heavy Duty Independent Rail Systems by F.S. Industries, or a comparable product by another manufacturer.

2.02 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
- C. Square Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
- D. Steel Plates, Shapes, and Bars: ASTM A 36.
- E. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
- F. Miscellaneous Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.03 WELDING MATERIALS, FASTENERS, AND ANCHORS

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and

railings to other types of construction indicated and capable of withstanding design loads.

- C. For steel railings and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- D. Fasteners for Interconnecting Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
- E. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- F. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Cast-in-place anchors.
 - 2. Expansion anchors.

2.04 PAINT

- A. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with Steel Structures Painting Manual, Volume 2, Systems And Specifications, SSPC-Paint 20 and compatible with topcoat.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carboline 621; Carboline Company.
 - b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
 - c. Tneme-Zinc 90-97; Tnemec Company, Inc.
 - 2. Organic zinc-rich primed assemblies shall be allowed to cure for a minimum of one week prior to finish coating with paints specified in Division 9 Section "Painting."
- B. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- B. Interior Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

2.06 FABRICATION

- A. General: Fabricate heavy duty railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. NAAMM Railing Standard: Comply with NAAMM AMP 521-95, "Pipe Railing Systems Manual," for Type 1 railing.
- C. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- D. Welded Connections: Fabricate railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- E. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- F. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- G. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- H. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- I. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- J. Fabricate joints that will be exposed to weather in a watertight manner.
- K. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Provide exposed fasteners with finish matching appearance, including color and texture, of handrails and railings.

2.08 STEEL FINISHES

- A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."
- B. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Shop paint all steel with primer meeting requirements of Part 2 Article "Paint."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.02 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of steel that will come into contact dissimilar metals, including aluminum, with a heavy coat of bituminous paint.

- D. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.03 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.04 ANCHORING POSTS

- A. Anchor posts to floor with manufacturer's standard footplate:

3.05 ANCHORING RAILING ENDS

- A. Anchor railing ends into concrete and masonry with flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
- C. Weld flanges to railing ends.

3.06 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

3.07 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05522

SECTION 05530

GRATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Heavy-duty metal bar gratings.
 - 2. Metal frames and supports for gratings not a part of structural-steel framing system components.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel" for structural-steel framing system components.
 - 2. Division 5 Section "Metal Fabrications" for adjustable height grating platform.
 - 3. Division 5 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide gratings capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections:
 - 1. Type 1: Capable of withstanding a uniform load of 250 lbf/sq. ft. or a concentrated load of 3000 lbf, whichever produces the greater stress for, but not limited to, the following applications:
 - a. At floor level in locations not accessible to vehicular traffic.
 - b. At adjustable platforms in pits.
 - c. At floor level in lube rooms, compressor rooms and other locations not accessible to vehicular traffic.
 - d. At pit floor level in repair bays.
 - 2. Type 2: Capable of withstanding a uniform load of 250 lbf/sq. ft. or a concentrated load of 8000 lbf, whichever produces the greater stress for, but not limited to, the following applications.
 - a. Sidewalks.
 - b. Vehicular driveways.
 - c. Trench drains.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Gratings and frames.
 - 2. Clips and anchorage devices for gratings.
 - 3. Paint products.
- B. Shop Drawings: Show fabrication and installation details for gratings. Include plans, sections, and details of connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
- C. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of gratings that are similar to those indicated for this Project in material, design, and extent.
- B. Fabricator Qualifications: A firm experienced in producing gratings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Metal Bar Grating Standards: Comply with applicable requirements of the following:
 - 1. Heavy-Duty Metal Bar Gratings: Comply with NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
- D. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
- E. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where gratings are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating gratings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.07 COORDINATION

- A. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal bar gratings that may be incorporated into the Work include, but are not limited to, the following:
 1. Alabama Metal Industries Corp.
 2. Harris Steel Ltd.; Fisher & Ludlow Div.
 3. IKG Industries.
 4. McNichols Co.
 5. Ohio Gratings, Inc.

2.02 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Wire Rod for Grating Crossbars: ASTM A 510.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy to be welded.

2.03 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.04 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Plain Washers: Round, carbon steel, ASME B18.22.1.
- D. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.05 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- C. Shear and punch metals cleanly and accurately. Remove burrs.
- D. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated.
- E. Fit exposed connections accurately together to form hairline joints.
- F. Welding: Comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
- G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.06 METAL BAR GRATINGS

- A. Fabricate welded, heavy-duty steel gratings with bearing bar size not less than 1-1/2 by 1/4-inch bearing bars at 1-3/16-inch o.c. and not less than that required to comply with structural performance requirements.
- B. Traffic Surface for Steel Bar Gratings: Plain.

- C. Steel Finish: As follows:
 - 1. Above Ground Floor Level: Shop primer applied according to manufacturer's standard practice.
 - 2. At or Below Ground Level: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

- D. Fabricate removable grating sections with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
 - 1. For Fixed (by Welding) Units Mounted to Structural Steel Framing or Framing Anchored to Concrete or Masonry Walls:
 - a. Provide not less than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
 - 2. For Removable Units Mounted to Perimeter and Intermediate Framing Cast or Anchor Bolted into Concrete Slabs:
 - a. Provide not less than four clamps for each grating section.
 - b. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.
 - c. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "Grate-Fast" by Struct-Fast Inc.

- E. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
 - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of the same size and material as bearing bars.

- F. Do not notch bearing bars at supports to maintain elevation.

2.07 GRATING FRAMES AND SUPPORTS

- A. Steel Frames and Supports: Fabricate from structural-steel shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

- B. Equip units with integrally welded anchors for casting into concrete or building into masonry.
 - 1. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

- C. Galvanize frames and supports.
 - 1. Exterior.
 - 2. Interior: At ground floor level and below.

- D. Prime Paint frame and supports:
 - 1. Interior: Above ground floor level.

2.08 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish gratings, frames, and supports after assembly.
- C. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with ASTM A 123.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed items:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of gratings, frames, and supports, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

3.02 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are the same; otherwise, fasten by bolting as indicated above.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05530

SECTION 05700

PERFORATED SHEET METAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes Perforated metal panels for roof screens.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for non-ornamental metal fabrications.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated, including finishing materials.
- B. Shop Drawings: For ornamental metal. Include plans, elevations, component details, and attachments to other work. Indicate materials and profiles of each ornamental metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Samples for Verification: For each type of exposed finish required.
 - 1. Samples, 18" x 18" minimum, for each pattern of perforated metal, including mounting method
- D. Qualification Data: For Installer.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for installation of ornamental metal specified in this Section by the same firm that fabricated it.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store ornamental metal inside a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with ornamental metal by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. If practical, provide allowance for trimming and fitting at site.

1.07 COORDINATION

- A. Coordinate installation of anchorages for ornamental metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Perforated Metal Panels:
 - a. Diamond Perforated Metals
 - b. McNichols Co.

2.02 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.03 STAINLESS STEEL

- A. Sheet, Strip, and Rods: Type 316.

2.04 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Items: Type 316 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
 - 1. Provide concealed fasteners for interconnecting components and for attaching ornamental metal items to other work, unless otherwise indicated.

- C. Anchors: Provide torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

2.05 FABRICATION, GENERAL

- A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- D. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items, unless otherwise indicated.

2.06 FABRICATING ORNAMENTAL GRILLES AND FRAMES

- A. Fabricate ornamental grilles from perforated steel sheet or plate of thickness, size, and pattern indicated. Form perforations by punching, cutting, or drilling to produce openings of sizes and shapes indicated. Roll, press, and grind perforated metal to flatten and to remove burrs and deformations.
 - 1. Pattern for perforated ornamental grilles: 1/4" diameter, 3/8" staggered centers, 40% open area, 16_ga.
- B. Drill and countersink grilles for mounting screws at 2 inches from corners and at 10 inches or less o.c. Provide units with oval-head screws made from metal matching grilles.
- C. Fabricate grille frames to sizes and shapes indicated. Miter frame members at corners and connect with concealed splice plates welded to back of frames.
 - 1. Drawings indicate frame profiles required and are based on products of one manufacturer. Similar frame profiles produced by other manufacturers may be considered, provided deviations are minor and do not change design concept as judged solely by Architect.
 - 2. Drill and countersink frames for mounting screws at 4 inches from corners and at 16 inches or less o.c. Provide units with oval-head self-tapping machine screws made from metal matching frames.

2.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal

Products" for recommendations for applying and designating finishes.

2.08 STEEL FINISHES

- A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
 - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
- B. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ornamental metal.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where needed to secure ornamental metal to in-place construction.
- B. Perform cutting, drilling, and fitting required to install ornamental metal. Set products accurately in location, alignment, and elevation; measured from established lines and levels.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of ornamental metal, restore finishes to eliminate evidence of such corrective work.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.

3.03 INSTALLING ORNAMENTAL METAL FABRICS

- A. Mount ornamental metal fabrics at heights and in positions indicated.
 - 1. Secure to framing and blocking with specified fasteners.

3.04 CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

3.05 PROTECTION

- A. Protect finishes of ornamental metal from damage during construction period with temporary protective coverings approved by ornamental metal fabricator. Remove protective covering at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05700

SECTION 06105

MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking and nailers.
 - 2. Plywood backing panels.
- B. Related Sections include the following:
 - 1. Division 6 Section "Interior Architectural Woodwork" for interior woodwork not specified in this Section.
 - 2. Division 9 Section "Gypsum Board Assemblies" for metal backing for wall mounted accessories in toilet rooms.

1.03 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

1.04 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
 2. Fire-retardant-treated wood.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Wood Structural Panels:
1. Plywood: Either DOC PS 1 or DOC PS 2.
 2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
 3. Factory mark panels according to indicated standard.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
 - a. Ammoniacal, or amine, copper quat (ACQ).
 - b. Copper bis (dimethyldithiocarbamate) (CDDC).
 - c. Ammoniacal copper citrate (CC).
 - d. Copper azole, Type A (CBA-A).

- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, blocking and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members less than 18 inches above grade.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
 - 2. Use treatment that does not promote corrosion of metal fasteners.
 - 3. Use Exterior type for exterior locations and where indicated.
 - 4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.04 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
 - 1. Mixed southern pine; SPIB.
 - 2. Eastern softwoods; NELMA.
 - 3. Northern species; NLGA.
 - 4. Western woods; WCLIB or WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine, No. 2 grade; SPIB.
 - 2. Eastern softwoods, No. 2 Common grade; NELMA.

3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.05 PANEL PRODUCTS

- A. Miscellaneous Concealed Plywood: Exposure 1 sheathing, span rating to suit framing in each location, and thickness as indicated but not less than 1/2 inch.
- B. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.06 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 1. Where carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Wood Screws: ASME B18.6.1.
- D. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- E. Lag Bolts: ASME B18.2.1..
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.

Locate nailers, blocking and similar supports to comply with requirements for attaching other construction.

- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Countersink fastener heads on exposed carpentry work and fill holes with wood filler.
- F. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.02 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.03 PANEL PRODUCT INSTALLATION

- A. Wood Structural Panels: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

END OF SECTION 06105

SECTION 06402

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate cabinets.
 - 2. Plastic-laminate countertops.
 - 3. Shop finishing interior woodwork.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for counter supports concealed in partitions walls and surface mounted on masonry walls.
 - 2. Division 6 Section "Miscellaneous Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 3. Division 8 Section "Flush Wood Doors" for units with plastic laminate finishes.

1.03 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
 - 4. Apply WIC-certified compliance label to first page of Shop Drawings.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

1. Shop-applied opaque finishes.
2. Plastic laminates.
3. Thermoset decorative overlays.

D. Samples for Verification: For the following:

1. Plastic-laminate-clad panel products, 8 by 10 inches, for each type, color, pattern, and surface finish.
2. Thermoset decorative-overlay surfaced panel products, 8 by 10 inches, for each type, color, pattern, and surface finish.
3. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.

D. Quality Standard: Unless otherwise indicated, comply with WIC's "Manual of Millwork, 11th Edition" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and will maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide materials that comply with requirements of the WIC quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species for Opaque Finish: Any closed-grain hardwood.
- C. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2 and as follows:
 - a. At Dry Locations: Grade MD.
 - b. At Sinks: Grade MD-Exterior Glue.

3. Particleboard: ANSI A208.1 and as follows:
 - a. At Dry Locations: Grade M-2.
 - b. At Sinks: Grade M-2-Exterior Glue
 4. Softwood Plywood: DOC PS 1.
 5. Hardwood Plywood: HPVA HP-1.
- D. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
1. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide products by manufacturers indicated on the Drawing's Material Finish Legend or comparable products by one of the following manufacturers.
 - a. Formica Corporation.
 - b. International Paper; Decorative Products Div.
 - c. Laminart.
 - d. Pioneer Plastics Corp.
 - e. Westinghouse Electric Corp.; Specialty Products Div.
 - f. Wilsonart International; Div. of Premark International, Inc.
- F. Adhesive for Bonding Plastic Laminate: Contact cement.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.02 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- D. Wire Pulls:
 1. Typical: Back mounted, 5 inches long, 1-1/4 inches deep, and 5/16 inches in diameter; EpcO MC-402-5 or equal.
 2. Barrier Free: Back mounted, 5 inches long, 2-1/2 inches deep, and 5/16 inches in diameter; EpcO MC-400 or equal.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.

- F. Adjustable Shelf Clips: Molded nylon or nickel plated steel with positive locking steel pin to fit pre-drilled holes on 2 inch centers.
1. Application: Typical except where indicated otherwise on Drawings.
- G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, complying with BHMA A156.9, Grade 1 and rated for the following loads:
1. 75 lbf. Class load rating at Keyboard Slide: Knap & Vogt No. 8100 Medium-duty, precision slide; Accuride 2009 or equal.
 2. 75 lbf. Class load rating at Pencil Drawer Slide: Knap & Vogt No. 8200 Medium-duty, precision slide; Accuride 2006 or equal.
 3. 75lbf. Class load rating, $\frac{3}{4}$ extension, at drawers less than 6 inches high: Knap & Vogt No. 8300 Medium-duty precision slide; Accuride 2132 or equal.
 4. 150 lbf. Class load rating at drawers greater than 6 inches and less than 18 inches high:
 - a. Full Extension unless otherwise noted: Knap Vogt No. 8500 Heavy-Duty, precision slide; Accuride 4034 or equal.
 - b. 1-1/2" Overtravel for Lateral File Drawers: Knap Vogt No. 8505 Heavy Duty, precision slide; Accuride 4034 or equal.
- H. Door Locks And Drawer Locks: BHMA A156.11, E07041 and E07121 Respectively National Cabinet Lock Series C8052, C8053, C8054 or C8055 as required for panel thickness, or equal.
- I. Grommets for Cable Passage through Countertops: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Product: Subject to compliance with requirements, provide "OG SG series" by Doug Mockett and Co., Inc.
 2. Color: Selected by Architect from manufacturer full range.
 3. Provide quantity for locating 36 inches o.c. at all reception and work counters; field verify final location with Owner's Representative.
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 2. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
 3. Satin Stainless Steel: BHMA 630.
- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.03 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.04 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Custom grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Complete fabrication, including assembly, finishing and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- D. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.05 PLASTIC-LAMINATE CABINETS

- A. Quality Standard: Comply with WIC Section 15.
- B. WIC Construction Style: Style A, Frameless.
- C. WIC Construction Type: Type I, multiple self-supporting units rigidly joined together.
- D. WIC Door and Drawer Front Style: Flush overlay.
- E. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops:
 - a. PLF-1: HGS.
 - b. PLF-2: HGP.
 - c. PLF-3: HGS.

2. Vertical Surfaces:
 - a. PLF-1: HGS or VGP at Contractor's option.
 - b. PLF-2: VGP.
 - c. PLF-3: HGS or VGP at Contractor's option.
3. Edges:
 - a. PLF-1: HGS.
 - b. PLF-2: HGP.
 - c. PLF-3: HGS.

F. Materials for Semiexposed Surfaces: Provide surface materials indicated below:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative overlay.
2. Drawer Sides and Backs: Solid-hardwood lumber with opaque finish matching thermoset decorative overlay.
3. Drawer Bottoms: Thermoset decorative overlay.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics on the Drawing's Materials Finish Legend.

H. Provide dust panels of 1/4-inch plywood or tempered hardboard above locked compartments and drawers, unless located directly under tops.

2.06 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Comply with WIC Section 16.

B. High-Pressure Decorative Laminate Grade:

1. PLF-1: HGS.
2. PLF-2: HGP.
3. PLF-3: HGS.

C. Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics on the Drawing's Materials Finish Legend.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material:

1. Dry Locations: Particleboard or medium-density fiberboard.
2. At Sinks: Particleboard or medium-density fiberboard made with exterior glue.

2.07 SHOP FINISHING

A. Quality Standard: Comply with WIC Section 5, unless otherwise indicated.

1. Grade: Provide finishes of same grades as items to be finished.

- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.
- D. Opaque Finish: Comply with requirements indicated below for grade, finish system, color, effect, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
 - 1. WIC Finish System: One of following at Contractor's Option:
 - a. #1b: Catalyzed lacquer.
 - b. #1d: Vinyl lacquer (catalyzed).
 - c. #3: Catalyzed polyurethane.
 - 2. Color: Match color of adjacent thermoset decorative overly.
 - 3. Sheen: Satin, 30-50 gloss units.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A. Quality Standard: Install woodwork to comply with WIC Section referenced for each type of casework, for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching of cabinets with transparent finish.
 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with one of following as applicable to conditions indicated on Drawings:
 - a. No. 10 wafer-head screws sized for 1-inch penetration into wood blocking, or hanging strips.
 - b. No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
 - c. Toggle bolts through metal backing or metal framing behind wall finish.
- F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 4. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
- G. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 07115

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes cold-applied, emulsified- asphalt dampproofing and protection course applied to the following surfaces:
 - 1. Exterior, below-grade surfaces of concrete footings, foundations and stem walls.
- B. Related Sections include the following:
 - 1. Division 7 Section "Building Insulation" for perimeter board insulation.
 - 2. Division 7 Sections "Self-adhering Sheet Waterproofing" and "Cold Fluid-applied Waterproofing" for waterproofing.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.
- B. Material Certificates: For each product, signed by manufacturers.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.05 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.01 BITUMINOUS DAMPPROOFING

- A. Cold-Applied, Emulsified-Asphalt Dampproofing:
 - 1. Trowel Coats: ASTM D 1227, Type II, Class 1.
 - 2. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
 - 3. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Euclid Chemical Company (The).
 - 2. Gardner Asphalt Corporation.
 - 3. Henry Company.
 - 4. Karnak Corporation.
 - 5. Koppers Industries, Inc.
 - 6. Malarkey Roofing Company.
 - 7. Meadows, W. R., Inc.
 - 8. Sonneborn, Div. of ChemRex, Inc.
 - 9. Tamms Industries.

2.02 MISCELLANEOUS MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.
- B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- C. Protection Course, Roll-Roofing Type: Smooth-surfaced roll roofing complying with ASTM D 224, Type II.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace, W. R. & Co.; Construction Products Div.
 - b. Meadows, W. R., Inc.
 - c. Sonneborn, Div. of ChemRex, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
 - 1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.03 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
 - 1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
 - 2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
- B. Apply dampproofing to earthbearing faces of footings and foundation walls.
 - 1. Apply from top of slab and finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing.
 - 2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat required for embedding fabric is in addition to other coats required.

3.04 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. On Concrete Footings: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..

3.05 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course. Support protection course with spot application of trowel-grade mastic where not otherwise indicated.

3.06 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 07115

SECTION 07190

WATER REPELLENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes clear water-repellent coatings for the following exterior vertical and nontraffic horizontal surfaces:
 - 1. Concrete unit masonry (unpainted and unglazed).
 - 2. Cast stone sills.
- B. Related Sections include the following:
 - 1. Division 4 Sections for concrete unit masonry and cast stone.
 - 2. Division 7 Section "Joint Sealants" for joint sealants.
 - 3. Division 7 Sections for fluid-applied dampproofing.
 - 4. Division 9 Section "Painting" for paints and coatings.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide water repellents with the following properties based on testing manufacturer's standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.
 - 1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens.
 - a. Concrete Unit Masonry: ASTM C 140.
 - b. Hardened Concrete (Cast Stone): ASTM C 642
 - 2. Water-Vapor Transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.
 - 3. Water Penetration and Leakage through Masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, per ASTM E 514.
 - 4. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, per ASTM G 53.
 - 5. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, per ASTM D 1653.

1.04 SUBMITTALS

- A. Product Data: Include manufacturer's specifications, surface preparation and application instructions, recommendations for water repellents for each surface to be treated, and protection and cleaning instructions. Include data substantiating that

materials are recommended by manufacturer for applications indicated and comply with requirements.

- B. Applicator Certificates: Signed by manufacturer certifying that the applicator complies with requirements.
- C. Certification by water repellent manufacturer that products supplied comply with local regulations controlling use of VOCs.
- D. Material Test Reports: Indicate and interpret test results for compliance of water repellents with requirements indicated.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who employs only persons trained and approved by water repellent manufacturer for application of manufacturer's products.
- B. Regulatory Requirements: Comply with applicable rules of pollution-control regulatory agency having jurisdiction in Project locale regarding VOCs and use of hydrocarbon solvents.
- C. Field Samples: Architect will select one representative surface for each substrate to receive water repellents. Apply water repellent to each substrate, with either partial or full coverage as directed. Comply with application requirements of this Section.
 - 1. Obtain Architect's approval of field samples before applying water repellents.
 - 2. Maintain field samples during construction in an undisturbed condition as a standard for judging the completed Work.

1.06 PROJECT CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
 - 1. Ambient temperature is less than 40 deg F.
 - 2. Cast stone and mortar has cured for less than 28 days.
 - 3. Rain or temperatures below 40 deg F are predicted within 24 hours.
 - 4. Application is earlier than 24 hours after surfaces have been wet.
 - 5. Substrate is frozen or surface temperature is less than 40 deg F.
 - 6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

1.07 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty, executed by the applicator and water repellent manufacturer, covering materials and labor, agreeing to repair or replace materials that fail to provide water repellency within the specified warranty period. Warranty does not include deterioration or failure of coating due to unusual weather

phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1/16 inch wide, fire, vandalism, or abuse by maintenance equipment.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 WATER REPELLENTS FOR VERTICAL AND NONTRAFFIC BEARING HORIZONTAL SURFACES

- A. At Concrete Masonry Unit Walls: Subject to compliance with requirements, products that may be incorporated into the Work are limited to the following.

1. Silanes, 40 Percent Solids:

- a. Sivento, Inc., subsidiary of Degussa; Chem-Trete PB VOC.
- b. Chemrex, subsidiary of Degussa; Masterseal SL 40 VOC.
- c. LumTal International, Inc.; Iso-Flex 618-40 W.B.

2. Siloxanes:

- a. Weather Seal Siloxane WB; ProSoCo, Inc.

3. Silane/Siloxane Blends:

- a. Chemrex, subsidiary of Degussa; Hydrozo Enviroseal Double 7 HD.

- B. At Cast Stone Units including Sills: Subject to compliance with requirements, products that may be incorporated into the Work are limited to the following

1. Silane: With 3.3 lb/gal. (400 g/L) VOCs or less.

- a. Sonneborn, Sonoshield, White ROC 10 VOC; ChemRex, Inc.

2. Siloxanes: With 3.3 lb/gal. (400 g/L) VOCs or less:

- a. Sure Klean, Weather Seal, Siloxane WB Concentrate; ProSoCo, Inc.
- b. Prime A Pell H2O (Brick & Precast Formula or Concentrate); Chemprobe Coating Systems, L.P.

3. Silane/Siloxane Blends: With 3.3 lb/gal. (400 g/L) VOCs or less.

- a. Hydrozo, Enviroseal Double 7 for Brick; ChemRex Inc.

2.02 WATER REPELLENTS

- A. Silanes, 20 Percent Solids: Penetrating water repellent. A monomeric compound containing approximately 20 percent alkyltrialkoxysilanes with alcohol, mineral spirits, water, or other proprietary solvent carrier.

- B. Silanes, 40 Percent Solids: Penetrating water repellent. A monomeric compound containing approximately 40 percent alkyltrialkoxysilanes with alcohol, mineral spirits, water, or other proprietary solvent carrier.
- C. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that are oligomeric with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.
- D. Silane/Siloxane Blends: Consisting of silanes and siloxanes blended to achieve a particular penetration and protection on a specific substrate.
- E. VOC-Complying Water Repellents: Products complying with local regulations controlling use of VOCs, as certified by manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to repellent manufacturer's written instructions, to ensure surface is sufficiently dry.
 - 1. Cast Stone: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
- B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- E. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.
 - 1. Revisions of planned application, if any, as requested by Architect, will be by Change Order if they constitute a departure from requirements of Contract Documents at the time of contracting.

3.02 APPLICATION

- A. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
 - 1. Cast Stone Work: At Contractor's option, first application of water repellent on precast concrete units may be completed before installing units. Mask sealant-bond surfaces to prevent water repellent from migrating onto joint surfaces.
- B. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect and approve the substrate before application and to instruct the applicator on the product and application method to be used.

3.04 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 07190

SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

- 1. Foundation wall insulation (supporting backfill).
- 2. Concealed building insulation at locations including following:
 - a. Exterior metal framed exterior walls.
 - b. CMU exterior walls with metal framed furring.
 - c. Interior bottom side of roof decking.
- 3. Vapor retarders.
- 4. Insulation fasteners.

- B. Related Sections include the following:

- 1. Division 7 Section "Self-Adhering Sheet Waterproofing" for insulation installed with waterproofing.
- 2. Division 7 Section "Built-up Asphalt Roofing" for insulation specified as part of roofing construction.
- 3. Division 9 Section "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation specified by reference to this Section.
- 4. Division 15 Sections "Duct Insulation," "Equipment Insulation," and "Pipe Insulation."

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
- C. Research/Evaluation Reports: For foam-plastic insulation.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Extruded-Polystyrene Board Insulation:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Tenneco Building Products.
 2. Molded-Polystyrene Board Insulation:
 - a. DiversiFoam Products.
 - b. Manufacturers with a third-party certification program satisfying model building code mandatory requirements for foam plastics.
 3. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Knauf Fiber Glass.
 - d. Owens Corning.

4. Slag-Wool-/Rock-Wool-Fiber Insulation:
 - a. Fibrex Insulations Inc.
 - b. Owens Corning.
 - c. Thermafiber.

5. Foil-faced Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1 or 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches.
 - a. Atlas Roofing Corporation.
 - b. Dow Chemical Company.
 - c. Rmax, Inc.

2.02 INSULATING MATERIALS, GENERAL

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

2.03 PERIMETER FOUNDATION INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 1. Type VI, 1.80 lb/cu. ft. minimum density and 40-lb/sq. in. minimum compressive strength.
 2. Thickness: 2-inches unless indicated otherwise on Drawings.

2.04 CONCEALED BUILDING INSULATION IN METAL FRAMED EXTERIOR WALLS

- A. Insulation Thermal Resistance Value: Comply with following except where indicated otherwise on Drawings:
 1. At 4-inch Stud Walls: R-13 minimum.
 2. At 6-inch Stud Walls: R-19 minimum.

- B. Contractor's Option: Contractor may use either faced units, or unfaced units in combination with specified vapor barrier at their option.

- C. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- D. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass, slag wool, or rock wool.

1. Flanged Units: Provide faced blankets fabricated with 2-inch nominal wide facing flanges along edges for attachment to framing members and to provide an overlapping sealed joint.

2.05 CONCEALED BUILDING INSULATION AT CMU EXTERIOR WALLS IN FURRED METAL FRAMING

- A. Insulation Thickness: Match depth of stud furring.
- B. Contractor's Option: Contractor may use either extruded or molded polystyrene board at their option.
- C. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 1. Type IV, 1.60 lb/cu. ft.
- D. Molded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 1. Type II, 1.35 lb/cu. ft.

2.06 CONCEALED BUILDING INSULATION ON INTERIOR BOTTOM SIDE OF ROOF DECKING

- A. Insulation Thermal Resistance Value: R-30 minimum.
- B. Contractor's Option: Contractor may use either faced units, or unfaced units in combination with specified vapor barrier at their option.
- C. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
 1. Nominal Density: Either of following at Contractor's option:
 - a. 1.0 lb/cu. ft., thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - b. Nominal density of not less than 1.5 lb/cu. ft. nor more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - c. Combustion Characteristics: Passes ASTM E 136.
- D. Foil-Faced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on one side with foil-scrim-kraft vapor retarder; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
 1. Nominal density: Either of following at Contractor's option:
 - a. 1.0 lb/cu. ft., thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - b. Not less than 1.5 lb/cu. ft. nor more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.07 VAPOR RETARDERS

- A. Contractor's Option: Contractor may use either foil-polyester film or reinforced foil-faced kraft scrim vapor vapor barrier at their option.
- B. Foil-Polyester Film Vapor Retarder: 2 layers of 0.5-mil- thick polyester film laminated to an inner layer of 1-mil- thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indices of 5.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alumiseal Corporation; Zero Perm.
- C. Reinforced Foil-Faced Kraft Scrim Vapor Retarder: 1 layer of aluminum foil and 1 layer of kraft paper laminated to an inner layer of fiberglass mesh reinforcing, complying with ASTM C 1136, Type II for physical properties and ASTM E-84 for flame-spread and smoke-developed indices of not more than 20 and 5 respectively.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Compac Corporation; FB 30.
- D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.08 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- B. Protection Board: Premolded, multi-ply, semirigid board, 1/8 inch thick, consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on one side with polyethylene film.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - a. Protection Course II; ChemRex, Inc.; Sonneborn Building Products Div.
 - b. Bituthene Asphaltic Hardboard; Grace: W.R. Grace & Co.
 - c. PC-2 Protection Course; Meadows: W.R. Meadows, Inc.

2.09 INSULATION FASTENERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Adhesively Attached, Spindle-Type Anchors:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchor:
 - a. Gemco; 90-Degree Insulation Hangers.
 3. Insulation-Retaining Washers:
 - a. AGM Industries, Inc.; RC or SC series.
 - b. Gemco; Dome-Cap.
 - c. Gemco; R or S series.
 4. Insulation Standoff:
 - a. Gemco; Clutch Clip.
 5. Anchor Adhesives:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.
- B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch in diameter, length to suit depth of insulation indicated.
- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 2 inches square or in diameter.
1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Ceiling plenums.
- D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
1. Air Space: 1 inch.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF PERIMETER INSULATION

- A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - 1. If not indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to insulation manufacturer's written instructions.

3.05 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

- B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
- E. Install board insulation on metal and concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- F. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.06 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

- C. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.07 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07422

GLASS-FIBER-REINFORCED PLASTIC GRATING WALL PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Exterior wall panels fabricated from glass-fiber-reinforced plastic gratings.
 - 2. Grating wall panel accessories including fasteners and clips.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel" for structural framing supporting grating panels.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for flashing, gutters, and other sheet metal work adjacent to grating panels.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Glass-fiber-reinforced plastic gratings.
 - 2. Clips, fasteners and anchorage devices for gratings.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details showing connections to other work.
- C. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch- long-by-actual-width Sample of grating panel.
 - 2. Clips, fasteners and anchors.

1.04 QUALITY ASSURANCE

- A. Source Limitations for grating panel: Obtain each type, color, texture, and pattern of grating panel, including related accessories, through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide grating panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Flame Spread: 25 or less.
- C. Mockup: Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects.
 1. Build mockup full height at outside corner.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in a dry, well-ventilated, weathertight place.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with grating panels by field measurements before fabrication and indicate measurements on Shop Drawings.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating grating panels without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 2. Provide allowance for trimming and fitting at site.

1.07 COORDINATION

- A. Coordinate installation of anchorages for grating panels and supports. Deliver such items to Project site in time for installation.

1.08 SEQUENCING

- A. Coordinate installation with flashings, gutters and other adjoining construction to ensure proper sequencing.

PART 2 - PRODUCTS

2.01 GLASS-FIBER-REINFORCED PLASTIC GRATING PANEL

- A. Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings assembled from components made by simultaneously pulling glass fibers and extruding thermosetting plastic resin through a heated die under pressure to produce a product without voids and with a high glass-fiber content.
 1. Configuration: I6015; 1-1/2-inch I-bars spaced 1-1/2 inches o.c. (60 percent open).
 2. Weight: Not less than 2.83 lb/sq. ft.
 3. Resin Type: Polyester.
 - a. Flame-Spread Index: As indicated in Part 1 Article "Performance Requirements."

- b. UV Protection: Manufacturer's standard coating or integral membrane resistant to ultraviolet radiation and designed to protect grating from degradation.
- 4. Color: Gray.
 - 5. Exposed (Traffic) Surface: Plain, grooved.
 - 6. Basis-of-Design Product: Subject to compliance with the requirements provide McNichols; Fiberglass Grating MS I-6015 I-bar without grit or a comparable product by one of the following:
 - a. Creative Pultrusions, Inc.
 - b. Enduro Systems Inc.; Composite Products Division.
 - c. Fibergrate Composite Structures Inc.
 - d. Fisher & Ludlow.
 - e. IKG Industries; a Harsco Company.
 - f. Seasafe, Inc.
 - g. Strongwell.
- B. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

2.02 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners. Select fasteners for type, grade, and class required.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
 - 1. Provide bolt type indicated on Drawings.
- C. Plain Washers: Round, ASME B18.22.1.
- D. Lock Washers: Helical, spring type, ASME B18.21.1.

2.03 FABRICATION

- A. Shop Assembly: Fabricate grating panel sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly identify units with temporary marks for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated.
- D. Fit exposed connections accurately together to form hairline joints.
 - 1. Corner Joints: As indicated on Drawings.
 - 2. Intermediate Vertical Joints: Butt.

3. Horizontal joints will not be accepted, provide full height panels.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure grating panels rigidly in place and to support indicated loads.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of grating panel. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.03 INSTALLING GLASS-FIBER-REINFORCED PLASTIC GRATINGS

- A. Fastening to In-Place Construction: Attach units to supporting members with type and size of clips and fasteners indicated on Shop Drawings.
- B. Install grating panel in lengths, patterns and with joints locations indicated on Shop Drawings.
- C. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing grating panels. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Fasteners: Install nuts for U-bolts on the side of the grating panel indicated on Drawings. Peen ends of bolts or score threads to prevent removal of nuts.

3.04 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective grating panels and replace with new panels complying with specified requirements.
- B. Clean finished surfaces according to grating panel manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07422

SECTION 07511

BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

- 1. Roof System Type:

- a. Field: Cool Roof coating on smooth surfaced 4 ply built-up asphalt roofing membrane on cover board on metal decking.
- b. Flashing: Cool Roof coating on smooth surfaced flashing sheet on backer sheet on glass mat gypsum sheathing.

- 2. Roofing materials including, but not limited to, the following:

- a. Smooth ply sheets.
- b. Backer sheets.
- c. Smooth ply flashing sheets.
- d. Roofing asphalt.
- e. Fasteners.
- f. Cant and edge strips.
- g. Cover board.
- h. Cool Roof Coating.
- i. Walkway pads.

- B. Products Installed But Not Supplied Under This Section:

- 1. Counterflashing, roof penetration flashing and roof drain flashing are provided under Division 7 Section "Sheet Metal Flashing and Trim."

- C. Related Sections include the following:

- 1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
- 2. Division 9 Section "Gypsum Sheathing" for glass-mat gypsum sheathing applied to vertical surfaces
- 3. Division 15 Section "Plumbing Specialties" for roof drains.

1.03 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the

temperature at which its viscosity is 125 centipoise for mopping application and 75 centipoise for mechanical application, within a range of plus or minus 25 deg F, measured at the mop cart or mechanical spreader immediately before application.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7 for each of the following conditions:
 - 1. Corner Uplift Pressure: As measured for a distance of not less than 15 feet from parapets or edge of roof meeting at building corner.
 - 2. Perimeter Uplift Pressure: As measured for a distance of not less than 10 feet from parapets or edge of building roof.
 - 3. Field-of-Roof Uplift Pressure: All other areas of building roof.
- D. Cool Roofs In Buildings: Comply with California Energy Commission, Title 24, performance requirements:
 - 1. Supervising and Certifying Entity: Cool Roof Rating Council (CRRC)
 - 2. Initial Solar Reflectance: 0.70 or greater.
 - 3. Initial Thermal Emittance: 0.75 or greater.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings, cants, and membrane terminations.
 - 2. Crickets, saddles, and tapered edge strips, including slopes.
 - 3. Cover board fastening patterns.
- C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of meeting performance requirements.
 - 2. Include Cool Roof Rating Council (CCRC) certificate indicating current CCRC Product ID and current testing results. Include 3-year solar reflectance and thermal emittance if available.
- E. Qualification Data: For Installer and manufacturer.

- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
 - 1. Indicate that bulk roofing asphalt materials delivered to Project comply with requirements. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.
 - 2. Include continuous log showing time and temperature for each load of bulk asphalt, indicating date obtained from manufacturer, where held, and how transported before final heating and application on roof.
- G. Research/Evaluation Reports: For components of roofing system.
- H. Maintenance Data: For roofing system to include in maintenance manuals.
- I. Warranties: Special warranties specified in this Section.
- J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for roofing system identical to that used for this Project.
- C. Source Limitations: Obtain components for roofing system from or sources approved by roofing system manufacturer.
- D. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- E. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review structural loading limitations of roof deck during and after roofing.
5. Review governing regulations and requirements for insurance and certificates if applicable.
6. Review temporary protection requirements for roofing system during and after installation.

F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review unresolved and unfinished issues from Preliminary Roofing Conference.
3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
4. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
5. Review roof observation and repair procedures after roofing installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.08 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail

in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, fasteners, cover boards, substrate board (thermal barrier), walkway products and other components of roofing system.
 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer and Product: Subject to compliance with requirements, provide Johns Manville International, Inc.; 4GIG, Four Ply Smooth Surface Fiber Glass Built-Up Roof or comparable product by one of the following manufacturers:
1. Firestone Building Products Company.
 2. GAF Materials Corporation.
 3. Intec/Permaglas; Div. of U.S. Intec, Inc.
 4. Malarkey Roofing Company.
 5. TAMKO Roofing Products, Inc.
 6. Tremco, Inc.

2.02 ROOFING MEMBRANE PLIES

- A. Ply Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.
- B. Basis of Design Manufacturer and Product: Subject to compliance with requirements, provide Johns Manville International, Inc.; GlasPly Premier or GlasPly IV or comparable product by one of the manufacturers listed in Part 2 Article "Manufacturer."

2.03 FLASHING MATERIALS

- A. Backer Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.
- B. Flashing Sheet: Either of following manufacturer's standard SBS-modified asphalt sheets:
1. ASTM D 6164, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified and as follows:
 2. ASTM D 6162, Type I or II, composite polyester- and glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified and as follows:
 3. ASTM D 6163, Type I or II, glass-fiber-reinforced, SBS-modified asphalt sheet;

granular surfaced; suitable for application method specified and as follows:
4. Granule Color: Gray.

- C. Glass-Fiber Fabric: Woven glass cloth, treated with asphalt, complying with ASTM D 1668, Type I.

2.04 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D 312, Type III.

2.05 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.
- B. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- D. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."
- E. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.06 ROOF ACCESSORIES

- A. General: Roof accessories recommended by perlite board manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof perlite board to substrate, and acceptable to roofing system manufacturer.
- C. Provide preformed saddles, crickets, tapered edge strips, and other perlite board shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- D. Cant Strips: ASTM C 728, perlite board.
- E. Wood Nailer Strips: Comply with requirements in Division 6 Section "Miscellaneous Carpentry."
- F. Tapered Edge Strips: ASTM C 728, perlite board.
- G. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.
 - 1. Product: Subject to compliance with requirements, provided "Dens-Deck" by Georgia-Pacific Corporation.

H. Substrate Joint Tape: 6- or 8-inch- wide, coated, glass-fiber joint tape.

2.07 COOL ROOF COATING MATERIALS

- A. Roof Coating: ASTM D 6083, acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and certified by Cool Roof Rating Council (CCRC) for use to achieve Cool Roof Rating indicated in Part 1 Article "Performance Requirements."
1. Color: White.
 2. Basis of Design Product: Subject to compliance with requirements, provide Johns Manville International, Inc.; TopGard 4000 or comparable product by, but not limited to, the following manufacturers:
 - a. Firestone Building Products.
 - b. GAF Materials Corporation.
 - c. Tremco Incorporated.
 - d. United Coatings

2.08 WALKWAYS

- A. Walkway Pads: Polymer-modified, reconstituted solid-rubber, surface-textured, slip-resisting, interlocking pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 3/4 inch thick, minimum.
1. Pad Size: As indicated on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
 3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5 Section "Steel Deck."
 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.03 COVER BOARD AND RELATED ACCESSORIES INSTALLATION

- A. Coordinate installing roofing system components so cover board, perlite, and wood accessories are not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing cover board and related accessories.
- C. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of built-up roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
- D. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Mechanically Fastened Cover Board: Install cover board and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type to deck type.
 - 1. Fasten cover board to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Install cover boards with long joints in continuous straight lines with end joints staggered between rows.
 - 3. Loosely butt cover boards together and fasten to roof deck.
 - 4. Tape joints if required by roofing system manufacturer.

3.04 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install built-up roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- B. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing built-up roofing system.
- D. Coordinate installing roofing system components so cover board, perlite accessories, wood accessories, and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and cover board with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Asphalt Heating: Heat roofing asphalt and apply within plus or minus 25 deg F of equiviscous temperature unless otherwise required by roofing system manufacturer. Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt

maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

- F. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.05 ROOFING MEMBRANE INSTALLATION

- A. Install four ply sheets starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
 - 1. Embed each ply sheet in a solid mopping of hot roofing asphalt applied at rate required by roofing system manufacturer, to form a uniform membrane without ply sheets touching.

3.06 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
 - 1. Backer Sheet Application: Install backer sheet and adhere to substrate in a solid mopping of hot roofing asphalt.
 - 2. Flashing Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement; apply cement at rate required by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
- D. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
 - 1. Built-up Stripping: Install stripping of not less than 2 roofing membrane ply sheets, setting each ply in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt, and extend onto roofing membrane 4 inches and 6 inches, respectively.
- E. Roof Drains: Set 30-by-30-inch metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - 1. Install stripping of not less than two roofing membrane ply sheets, each set in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt.

3.07 COATING INSTALLATION

- A. Apply coatings to roofing membrane and base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.
 - 1. Thickness: Not less than 20 mils dry film thickness.

3.08 WALKWAY INSTALLATION

- A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

3.11 ROOFING INSTALLER'S WARRANTY

(See Roofing Installer's Warranty next page)

ROOFING INSTALLER'S WARRANTY

A. WHEREAS <Insert name> _____
of <Insert address> _____,
herein called the "Roofing Installer," has performed roofing and associated work
("work") on the following project:

1. Owner: _____
2. Address: _____
3. Building Name/Type: _____
4. Address: _____
5. Area of Work: _____
6. Acceptance Date: _____
7. Warranty Period: _____
8. Expiration Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 80 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of <Insert month and year> _____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 07511

SECTION 07610

SHEET METAL ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes roofing system Type A and the following:
 - 1. Standing-seam sheet metal roofing and integral fascia, on-site, roll-formed.
 - 2. All trim integral with roofing and gutter including the following:
 - a. Fascia.
 - b. Eave.
 - c. Peak.
 - d. Rake.
 - 3. Insulation board with facer.
 - 4. Underlayment and slip sheet.
 - 5. Roofing accessories including closures, clips and backing plates.
 - 6. Installers Warranty Form.
- B. Products Installed But Not Supplied Under This Section: Wood blocking and nailers specified in Division 6 Section "Miscellaneous Carpentry".
- C. Related Sections include the following:
 - 1. Division 5 Section "Steel Deck" for steel roof deck supporting sheet metal roofing.
 - 2. Division 5 Section "Cold-Formed Metal Framing" for secondary support framing supporting sheet metal roofing.
 - 3. Division 7 Section "Manufactured Metal Wall Panels " for factory formed metal soffit and fascia panels.
 - 4. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, copings, flashings and other sheet metal work not part of sheet metal roofing.
 - 5. Division 7 Section "Joint Sealants" for field-applied sheet metal roofing sealants.
 - 6. Division 15 Section "Storm Drainage Piping" for drain and downspouts piping connecting to built-in gutters.
- D. Products Installed But Not Supplied Under This Section:
 - 1. Wood sheathing (exterior application) and decking (interior application) are specified in Division 6 Section "Miscellaneous Carpentry."

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide complete sheet metal roofing system, including, but not limited to, on-site, roll-formed metal roof panels, cleats, clips, anchors and fasteners, sheet metal

flashing and drainage components related to sheet metal roofing, fascia panels, trim, underlayment, and accessories as indicated and as required for a weathertight installation.

- B. Wind-Uplift Resistance: Provide portable roll-forming equipment capable of producing sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance.
 - 1. Maintain UL certification of portable roll-forming equipment for duration of sheet metal roofing work.
- C. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal roofing thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Water Infiltration: Provide sheet metal roofing that does not allow water infiltration to building interior, with metal flashing and connections of sheet metal roofing lapped to allow moisture to run over and off the material.

1.04 SUBMITTALS

- A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Details for forming sheet metal roofing, including seams and dimensions.
 - 2. Details for joining and securing sheet metal roofing, including layout of fasteners, clips, and other attachments. Include pattern of seams.
 - 3. Details of termination points and assemblies, including fixed points.
 - 4. Details of expansion joints, including showing direction of expansion and contraction.
 - 5. Details of roof penetrations.
 - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings.
 - 7. Details of special conditions.
 - 8. Details of connections to adjoining work.
 - 9. Details of the following accessory items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Roof curbs.
- C. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:

1. Sheet metal roofing and attachments.
 2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures and items mounted on roof curbs.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Roofing: 12 inches long by actual panel width, including finished seam. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 3. Accessories: 12-inch- long Samples for each type of accessory.
- E. Roll-Forming Equipment Certificate: Issued by UL for manufacturer's portable roll-forming equipment designed for producing sheet metal roofing. Show expiration date no earlier than two months after scheduled end of sheet metal roofing.
- F. Qualification Data: For Installer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sheet metal roofing portable roll-forming equipment. Include reports for structural performance.
- H. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of sheet metal roofing.
- B. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: An authorized representative of roll-formed sheet metal roofing manufacturer for fabrication and installation of units required for this Project.
- C. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials and insulation with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mockup of typical roof eave, including built-in gutter and fascia as shown on Drawings; approximately 48 inches square by full thickness, including attachments, underlayment, and accessories.

- a. Allow for attachment of soffit panels specified in Division 7 Section "Metal Soffit Panels."
 2. Approval of mockups is for other material and construction qualities specifically approved by Contracting Officer in writing.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Contracting Officer in writing.
- F. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roof deck construction and sheet metal roofing including, but not limited to, the following:
1. Meet with Contracting Officer, sheet metal roofing Installer, manufacturer's representative for sheet metal roofing portable roll-forming equipment and metal deck Installer, and installers whose work interfaces with or affects sheet metal roofing including installers of roof accessories and roof-mounted equipment.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to sheet metal roofing installation, including portable roll-forming equipment manufacturer's written instructions.
 4. Review structural loading limitations of metal deck during and after roofing.
 5. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal roofing.
 6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
 7. Review temporary protection requirements for sheet metal roofing during and after installation.
 8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- G. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to sheet metal roofing including, but not limited to, the following:
1. Meet with Contracting Officer, sheet metal roofing Installer, manufacturer's representative for sheet metal roofing portable roll-forming equipment, metal deck Installer, and installers whose work interfaces with or affects sheet metal roofing including installers of roof accessories and roof-mounted equipment.
 2. Examine metal deck conditions for compliance with requirements, including flatness and attachment to structural members.
 3. Review roof observation and repair procedures after sheet metal roofing installation.
 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
 5. Re-examine items reviewed in Preliminary Roofing Conference that require further attention or resolution.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver metal coils, components, and other sheet metal roofing materials so as not to be damaged or deformed. Package sheet metal roofing materials for protection during transportation and handling.
- B. Unload, store, and erect sheet metal roofing materials in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal coils and sheet metal roofing materials to ensure dryness. Do not store metal coils or sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.07 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Division 7 Section "Roof Accessories."
- B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of metal decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.08 WARRANTY

- A. Special Warranty on Metal Roof Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Warranty on Gutter Membrane: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane gutter system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, base flashings, roofing accessories, roof insulation and other components of membrane roofing system.
 - 2. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Installer's Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by Roofing Installer, in which Roofing Installer agrees to repair or

replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Loose parts.
 - c. Wrinkling or buckling.
 - d. Failure to remain weathertight, including uncontrolled water leakage.
 - e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including nonuniformity of color or finish.
 - f. Galvanic action between sheet metal roofing and dissimilar materials.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 ROOFING SHEET METALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 1. Either of following as standard with manufacturer:
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
 - c. Aluminum-Coated Steel Sheets: ASTM A 463/A 463M, T1-40 coating designation.
 2. Surface: Smooth, flat finish.
 3. Thickness: 0.0217 inch (24-gage), unless otherwise indicated.
 4. Exposed Finishes: Apply either of the following coil coatings as available from manufacturer to match color and finish indicated on Drawings:

- a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with physical properties and coating performance requirements of AAMA 2605.
- b. Manufacturer's standard clear-coat applied to pre-weathered aluminum-zinc alloy-coated steel sheet only. Clear coat designed to temporarily protect metal finish during fabrication and installation.
- c. Color: Match color indicated Drawing's Exterior Finish Schedule.

2.03 UNDERLAYMENT MATERIALS

- A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.
- B. Slip Sheet: Building paper, minimum 5 lb/100 sq. ft., rosin sized.

2.04 INSULATION

- A. Insulation Materials General: Provide preformed roof insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated.
 - 1. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFC's as blowing agents to comply with ASTM C 1289 and with Type II, felt or glass-fiber mat facer sheet on both major surfaces.
 - 2. Thickness: As indicated on Drawings.
- B. Insulation Accessories General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.
 - 1. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions of FM 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
 - 2. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
- C. Manufacturers: Subject to compliance with requirements, provide materials by one of the following:
 - 1. Apache Products Company.
 - 2. Atlas Roofing Corporation.
 - 3. Carlisle SynTec Incorporated.
 - 4. Celotex Corporation.
 - 5. Firestone Building Products Company.
 - 6. GAF Materials Corp.

7. Johns Manville International, Inc.
8. NRG Barriers, Inc.

2.05 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
- B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 1. Exposed Fasteners: Heads matching color of sheet metal roofing by means of plastic caps or factory-applied coating.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 3. Blind Fasteners: High-strength stainless-steel rivets.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight and as recommended by roll-formed sheet metal roofing manufacturer for installation indicated.
- E. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene sealant.

2.06 ACCESSORIES

- A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated.
 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal roofing.
 2. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.
 3. Cleats: Mechanically seamed cleats formed from the following material:
 - a. Metallic-Coated Steel Roofing: 0.0250-inch- thick, stainless-steel or nylon-coated aluminum sheet.
 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 5. Closures: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- B. Flashing and Trim: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent sheet metal roofing.
- C. Gutters: See Drawings for Details.
- D. Fascia: See Drawings for Details.
- E. Ridge (Rake) Closures: See Drawings for Details.

2.07 EQUIPMENT

- A. Portable Roll-Forming Equipment: Manufacturer's standard UL-certified equipment capable of forming sheet metal roofing in profiles indicated.
 - 1. Available Manufacturers:
 - a. Berridge Manufacturing Company.
 - b. Fabral, Inc.
 - c. Flexospan Steel Buildings, Inc.
 - d. Metal-Fab Manufacturing, LLC.
 - e. Morin Corporation; a Metecno Group Company.

2.08 FABRICATION

- A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.
 - 1. Standing-Seam Roofing: Form standing-seam pans with finished seam height of 1-1/2 inches.
- B. General: Fabricate roll-formed sheet metal roofing panels to comply with details shown and roll-formed sheet metal roofing manufacturer's written instructions.
- C. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
 - 1. No cross seams will be allowed without prior approval of Contracting Officer.
 - 2. Lay out sheet metal roofing so cross seams, when required, are made in direction of flow with higher pans overlapping lower pans. Stagger cross seams.
 - 3. Fold and cleat eaves and transverse seams in the shop.
 - 4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leakproof construction.

- D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant (concealed within joints).
- E. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- F. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.
- G. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Seal seams with elastomeric sealant.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.09 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, sheet metal roofing supports, and other conditions affecting performance of work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed.
 - 2. Examine metal decking to verify that insulation will be by decking and that installation is within flatness tolerances.
 - 3. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for gutter, flashings, and penetrations through sheet metal roofing.
 - 4. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before sheet metal roofing installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Lay out and screw wood blocking metal deck before installation of sheet metal roofing. Space fasteners as required to resist design uplift, but not more than 18 inches o.c unless indicated otherwise on Drawings.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- C. Prevent materials from entering and clogging gutter drains and conductors and from spilling or migrating onto surfaces of other construction. Remove gutter-drain plugs when no work is taking place or when rain is forecast.
- D. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- E. Install fasciae to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.03 INSULATION SHEATHING AND DECKING INSTALLATION

- A. General: Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Roof Type A:
 - 1. Install two layers of insulation and plywood sheathing under area of roofing to achieve thickness indicated on Drawings. Install layers with joints of each

succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

- a. Space plywood panels 1/8 inch apart at edges and ends.
2. Install insulation and sheathing with long joints of insulation and sheathing in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. At insulation Ffill gaps exceeding 1/4 inch with insulation.
3. Cut and fit insulation and sheathing within 1/4 inch of nailers, projections, and penetrations. Allow 1/8 inch gap between sheathing and abutting penetrations.
4. Mechanically Fastened Insulation and Sheathing: Install each layer of insulation and sheathing in same operation, and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation through sheathing and insulation to deck type.
 - a. Fasten insulation and sheathing to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Required fasteners shall secure both all layers.

3.04 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment and building-paper slip sheet on roof sheathing under sheet metal roofing. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under sheet metal roofing. Apply at locations indicated below, in shingle fashion to shed water, with lapped joints of not less than 2 inches.
 1. Apply from eave to ridge.
- B. Install flashings to cover underlayment to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.05 METAL ROOFING INSTALLATION, GENERAL

- A. General: Install sheet metal roofing perpendicular to purlins or supports. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
 1. Field cutting of sheet metal roofing by torch is not permitted.
 2. Rigidly fasten ridge end of sheet metal roofing and allow ridge end free movement due to thermal expansion and contraction. Predrill roofing.
 3. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.
 4. Flash and seal sheet metal roofing with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 6. Install ridge caps as sheet metal roofing work proceeds.
 7. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.

8. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
- B. Fasteners: Use stainless-steel fasteners of sizes that will not penetrate completely through substrate. Exposed fasteners other than those detailed are not allowed with Contracting Officer approval.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

3.06 ON-SITE, ROLL-FORMED SHEET METAL ROOFING INSTALLATION

- A. General: Install on-site, roll-formed sheet metal roofing to comply with sheet metal roofing manufacturer's written instructions for UL wind-uplift class indicated. Provide sheet metal roofing of full length from eave to ridge.
- B. Standing-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Before panels are joined, apply continuous bead of sealant to top flange of lower panel.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so cleat, sheet metal roofing, and field-applied sealant are completely engaged.

3.07 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete sheet metal roofing assembly including trim, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges

- folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.08 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.09 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform gutter tests and inspections and to prepare test reports.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Contracting Officer.
 1. Notify Contracting Officer 48 hours in advance of date and time of inspection.
 2. Submission of manufacturer's Warranty shall represent confirmation that roofing was installed in accordance with their requirements and to their satisfaction.
- C. Repair or remove and replace components of metal roofing and membrane gutter systems where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is installed. On completion of sheet metal roofing installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Correct deficiencies in or remove membrane gutter system that does not comply with requirements, repair substrates and repair or reinstall membrane gutter system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

- F. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

ROOFING INSTALLER'S WARRANTY

A. WHEREAS (Insert name) _____ of
(Insert address) _____,
herein called the "Roofing Installer," has performed roofing and associated work
("work") on the following project:

1. Owner: _____
2. Address: _____
3. Building Name/Type: _____
4. Address: _____
5. Area of Work: _____
6. Acceptance Date: _____
7. Warranty Period: _____
8. Expiration Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 85 mph;
 - c. Fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of (month and year) _____, 20____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 07610

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following sheet metal flashing and trim:
1. Formed roof drainage system.
 2. Formed low-slope roof flashing and trim.
 3. Formed wall flashing and trim.
 4. Formed equipment support flashing including pitch pockets.
 5. EPDM underlayment.
- B. Related Sections include the following:
1. Division 4 Section "Unit Masonry Assemblies" for installing through-wall flashing, reglets, and other sheet metal flashing and trim.
 2. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs and blocking.
 3. Division 7 Section " Built-Up Asphalt Roofing" for installing sheet metal flashing and trim integral with roofing membrane.
 4. Division 7 Section "Roof Accessories" for roof hatches and other manufactured roof accessory units.
 5. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.03 DEFINITIONS

- A. Gauge numbers and corresponding metal thicknesses shall be as indicated in the table below.

Gauge	U.S. Standard Gauge for Uncoated Hot & Cold Rolled Sheets	Galvanized Sheet Gauge for Hot-Dipped Zinc Coated Sheets
20	0.0359	0.0396
21	0.0329	0.0366
22	0.0299	0.0336
23	0.0269	0.0306
24	0.0239	0.0276
25	0.0209	0.0247
26	0.0179	0.0217

1.04 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 - 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim: 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: Full-size Sample.

1.06 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.08 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.01 SHEET METALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality, mill phosphatized for field painting.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality with manufacturer's standard clear acrylic coating both sides.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 with No. 2D (dull, cold rolled) finish.
- D. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.02 UNDERLAYMENT MATERIALS

- A. EPDM Flashing: Manufacturer's standard flashing product formed from a terpolymer of ethylene-propylene diene, complying with ASTM D 4637, 0.040 inch thick.
- B. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..

2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- D. Solder for Zinc: ASTM B 32, 60 percent lead and 40 percent tin with low antimony, as recommended by manufacturer.
- E. Burning Rod for Lead: Same composition as lead sheet.
- F. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- G. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of composition indicated below; and of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
 - 1. For Galvanized Metal: Polyurethane.
- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- I. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- K. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.04 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.05 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Fabricate downspouts from the following material:
 - a. Galvanized Steel: 0.0217 inch thick.
 - b. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
- B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4 inch wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - 1. Fabricate parapet scuppers from the following material:
 - a. Galvanized Steel: 0.0276 inch thick (24 gauge).
 - b. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (24 gauge).

- C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows.
 - 1. Fabricate conductor heads from the following material:
 - a. Galvanized Steel: 0.0276 inch thick.
 - b. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.

2.06 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96 inch long, but not exceeding 10 foot long, sections. Furnish with 6 inch wide joint cover plates and continuous cleats to support drip edge of external leg and fascia.
 - 1. Joint Style: Butt, with 12 inch wide concealed backup plate.
 - 2. Fabricate with scuppers spaced 10 feet apart, of dimensions required with 4 inch wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - 3. Fabricate scuppers from the following material:
 - a. Galvanized Steel: 0.0276 inch thick (24 gauge).
 - b. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (24 gauge).
- B. Copings: Fabricate in minimum 96 inches long, but not exceeding 10 foot long, sections. Fabricate joint plates of same thickness as copings.
 - 1. Furnish with one of following as indicated on Drawings:
 - a. Continuous cleats to support drip edge of external leg and drill elongated holes for fasteners on interior leg. Use where wood blocking indicated beneath coping.
 - b. Continuous cleats to support drip edge of external and internal legs and continuous pressure plate fabricated to fasten to supporting structure, exert an upward force on bottom of top face of coping and lock edges into cleats.
 - 2. Miter corners, seal, and solder or weld watertight.
 - 3. Joint Style: Butt, with 12 inch wide concealed backup plate.
 - 4. Fabricate copings from the following material:
 - a. Galvanized Steel: 0.0276 inch thick (20 gauge).
 - b. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (20 gauge).
- C. Base Flashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276 inch thick (24 gauge).
 - 2. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (24 gauge).
- D. Counterflashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0217 inch thick (26 gauge).
 - 2. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick (26 gauge).

- E. Flashing Receivers: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0217 inch thick (26 gauge).
 - 2. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick (26 gauge).
- F. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Lead: 4.0 lb/sq. ft., hard tempered.
 - 2. Galvanized Steel: 0.0276 inch thick (24 gauge).
 - 3. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (24 gauge).
- G. Splash Pans: Fabricate from the following material:
 - 1. Aluminum: 0.040 inch thick.
- H. Roof-Drain Flashing: Fabricate from the following material:
 - 1. Lead: 4.0 lb/sq. ft., hard tempered.

2.07 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96 inch long, but not exceeding 12 foot long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2 inch high end dams. Fabricate from the following material:
 - 1. Stainless Steel: 0.0156 inch thick.

2.08 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing including Pitch Pockets: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276 inch thick (24 gauge).
 - 2. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick (24 gauge).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous

items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
1. Coat side of uncoated stainless-steel and leadsheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of EPDM underlayment and cover with a slip sheet. Lap underlayment joint 6 inches minimum with adhesive and lap joint sealant recommended by EMPD manufacturer.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, elastomeric and butyl sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
1. Except where indicated to be continuous, space cleats not more than 12 inches apart.
 2. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
1. Galvanized or Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.
1. Pretinning is not required for lead.
 2. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
 3. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
 4. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.03 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspout to direct water away from building.
- C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 2. Loosely lock front edge of scupper with conductor head.
 3. Seal or solder exterior wall scupper flanges into back of conductor head.
- D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a

minimum of 4 inches and bed with elastomeric sealant.

1. Secure in a waterproof manner by one of following means as indicated on Drawings:
 - a. Snap-in installation and sealant or lead wedges and sealant.
 - b. Interlocking folded seam or blind rivets and sealant.
 - c. Anchor and washer at 36-inch centers.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.05 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of formed through-wall flashing is specified in Division 4 Section "Unit Masonry Assemblies."
- C. Reglets: Installation of reglets is specified in Division 4 Section "Unit Masonry Assemblies."

3.06 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
 1. Fill pitch pockets with cement grout and pourable elastomeric sealant.

3.07 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07720

ROOF HATCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes roof hatches with integral railings and safety post.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for ladders and miscellaneous metal framing and supports.
 - 2. Division 6 Section "Miscellaneous Carpentry" for wood nailers.
 - 3. Division 7 low-slope roofing Sections for roofing accessories.
 - 4. Division 7 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated metal flashing and counterflashing and miscellaneous sheet metal trim and accessories.
 - 5. Division 7 Section "Roof Expansion Assemblies" for manufactured roof expansion-joint covers.

1.03 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.04 QUALITY ASSURANCE

- A. Standards: Comply with the following:
 - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
 - 2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.07 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.01 METAL MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated and mill phosphatized for field painting.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.
- C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.
- D. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.
- E. Galvanized Steel Pipe: ASTM A 53/A 53M.

2.02 MISCELLANEOUS MATERIALS

- A. Glass-Fiber Board Insulation: ASTM C 726, 1 inch thick.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, 1 inch thick.
- C. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..
- D. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

2.03 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated single-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Babcock-Davis; a Cierra Products Inc. Company.
 - b. Bilco Company (The).
 - c. Custom Curb, Inc.
 - d. Dur-Red Products.
 - e. J. L. Industries, Inc.
 - f. Milcor Inc.; a Gibraltar Company.
 - g. Nystrom, Inc.
 - h. O'Keeffe's Inc.
 - i. ThyCurb; Div of Thybar Corporation.
 - j. Wasco Products, Inc.
2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
 3. Type and Size: Single-leaf lid, 30 by 36 inches unless indicated otherwise on Drawings.
 4. Curb Material: Galvanized or Aluminum-zinc alloy-coated steel sheet, 0.079 inch thick.
 5. Lid Material: Aluminum sheet, 0.090 inch thick with mill finish.
 6. Insulation: Glass-fiber or polyisocyanurate board.
 7. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
 8. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
 9. Hardware: Galvanized steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
 10. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
 - a. Basis of Design Manufacturer and Product: Subject to compliance with the requirements provide The Bilco Company; Model LU-1 or a comparable product by another available manufacturer.
 - b. Test Load: Single concentrated load of 200 pounds applied in any direction at any point at the top of post.
 - c. Height: 42 inches above finished roof deck.
 - d. Material and Finish: Steel tube, baked enameled.
 - e. Diameter: Pipe with 1-5/8-inch OD tube.
 11. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
 - a. Test Load:
 - 1) 20 pounds per linear foot applied in any direction at the top.
 - 2) Single concentrated load of 200 pounds applied in any direction at any point along the top and need not act concurrently with load in subparagraph above.
 - b. Height: 42 inches above finished roof deck.
 - c. Pipe or Tube: 1-1/4-inch ID galvanized pipe or 1-5/8-inch OD galvanized tube.
 - d. Flat Bar: 2-inch- high by 3/8-inch- thick galvanized steel.
 - e. Chain Passway Enclosure: Galvanized proof coil chain with quick link on fixed end.

- f. Pipe Ends and Tops: Covered or plugged with weather-resistant material.
- g. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- h. Fabricate joints that will be exposed to weather in a watertight manner.
- i. Close exposed ends of handrail and railing members with prefabricated end fittings.
- j. Fasteners: Manufacturer's standard.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
 - 2. Verify dimensions of roof openings for roof accessories.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious, install a course of felt underlayment and cover with a slip sheet.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Roof Hatch Installation:
 - 1. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
 - 2. Attach safety railing system to roof hatch curb.
 - 3. Attach ladder safety post according to manufacturer's written instructions.

3.03 TOUCH UP

- A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 9 painting Sections.

3.04 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION 07720

SECTION 07770

ROOF SCREEN WALL SUPPORT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes pre-engineered and pre-manufactured tubular support assembly designed to accept application of screening sheet materials.
- B. Related Sections include the following:
 - 1. Division 5 Section "Perforated Sheet Metal" for screen material attached to screen wall support channels.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for metal fascia attached to screen wall support channels.

1.03 SUBMITTALS

- A. Product Data: For each type of screen support assembly components indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for screen support assembly. Show layouts of including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.
- C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of screen support components specified in this Section.
 - 2. Method of attaching base supports to roof structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Pack, handle, and ship screen wall support assembly components properly labeled in heavy-duty packaging to prevent damage.

1.05 COORDINATION

- A. Coordinate layout and installation of base supports with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.01 SCREEN WALL SUPPORTS

- A. Provide screen wall support assembly capable of supporting superimposed live and dead loads, including screening material and other construction to be supported. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be screened.
- B. Basis of Design Manufacturer: Subject to compliance with requirements, provide products by RoofScreen Mfg.
- C. Load Requirements: See Structural Drawings.
- D. Screen Size: Perimeter as indicated on Drawings.
- E. Components: Include the following basis of design manufacturer components as required to provide a complete support assembly:
 - 1. Tubing: 2-1/2 inch outside diameter galvanized steel tube with 16 gage wall thickness.
 - 2. Base Connectors and Field Connectors: Fabricated from hot rolled steel sheet, with welded joints, zinc plated, and powder coated finish. Designed to attach tubing to tubing, and tubing to base cap.
 - 3. End Connectors: Fabricated from hot rolled steel sheet, with welded joints, zinc plated, and powder coated finish. Designed to attach end of tubing to other connectors.
 - 4. Base Supports: Vertical tubular member with footing (bottom) plate drilled or punched to accept attachment anchors. Designed to support screen wall and to accept base cap and jack flashing. Fabricated from hot rolled steel sheet, with welded joints, bare finish.
 - a. Height: Top of tube to extend not less than 8 inches above surface of roof membrane.
 - 5. Base Cap: Fabricated from hot rolled steel sheet, with welded joints, zinc plated, and powder coated finish. Designed to slip over lead sheet covered base support by not less than 2 inches to prevent water from penetrating base support, and to accept other connectors.
 - 6. Lead Jack Flashing: Fabricated from 4 lb./sq. ft. lead sheet, shaped to slip tightly over base support, and flash into roofing membrane; sized to extend not less than 4 inches beyond edges of footing plate all-around, and to extend to top of base support.
 - 7. Hat Section Furring: Fabricated from cold rolled galvanized 16 gage steel; 1.5 inch deep by 1.68 inch wide by 20 foot lengths.
 - 8. Fasteners:
 - a. For Fitting Connections: Stainless steel bolts, nuts and lockwashers.
 - 1) At base cap provide neoprene backed stainless steel washers selected to form a watertight seal.
 - b. For Attaching Fittings to Tubing: Stainless steel, self-drilling, self-tapping Tek screws.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, and is ready to receive base supports.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install roof screen wall support components according to Shop Drawings and manufacturer's written instructions. Anchor base supports and other components securely in place and capable of resisting forces specified. Use fasteners and other miscellaneous items as required for completing components installation. Install components to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install screen wall support framing level, plumb, true to line and elevation, and without jogs in alignment.
- C. Jack Flashing Installation: Secure to roof membrane according to roofing manufacturer's written instructions.

3.03 TOUCH UP

- A. Galvanized Surfaces: Clean bolted connections and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 07770

SECTION 07841

THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. 1 hr rated concrete masonry unit walls.
 - 2. 1 hr rated gypsum board partitions.
- B. Related Sections include the following:
 - 1. Division 15 Sections specifying duct and piping penetrations.
 - 2. Division 16 Sections specifying cable and conduit penetrations.

1.03 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.04 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.08 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 and include products by one of the following:
 - 1. Hilti Construction Chemicals, Inc. (Hilti)
 - 2. Nelson Firestop Products (Nelson).
 - 3. Specified Technologies Inc. (STI).
 - 4. 3M Fire Protection Products (3M).

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.03 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.04 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
 1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.05 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Through-penetration firestop system manufacturer's name.
 6. Installer's name.

3.06 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

3.07 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. General:

1. N/A* indicates that no UL-Classified system is available for manufacturer indicated. Manufacturer may provide engineer judgment drawing acceptable to Authorities having jurisdiction.
2. Jobsite conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected by Contractor.
3. If jobsite conditions do not match any UL-classified systems scheduled below then contact firestop manufacturer for alternative systems or engineer judgment drawings.
4. Where more than one applicable UL-Classified System is listed in the schedules, choose the UL System which is most economical for each through-penetration firestop system.
5. Coordinate work with other trades to assure that penetration opening sizes are appropriate for penetrant locations, and vice versa.
6. For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgment drawing.

C. Concrete or Block Walls:

CONCRETE OR BLOCK WALLS		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	F-RATING (HR)	HILTI	3M	STI	NELSON
CIRCULAR BLANK OPENINGS	1	CAJ 0055, CAJ 0070	CAJ 0009	CAJ 0006	CAJ 0043
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, WJ 1021	CAJ 1058	CAJ 1079, WJ 1070	CAJ 1191
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, CAJ 2098	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2089, CAJ 2031	CAJ 2096
SINGLE OR BUNDLED CABLES	1	WJ 3036, CAJ 3095, CAJ 3096	CAJ 3021	CAJ 3154	CAJ 3117
CABLE TRAY	1	WJ 4016, CAJ 4034, CAJ 4035	CAJ 4003	CAJ 4029, WJ 4022	CAJ 4001
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, CAJ 5061	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5103, CAJ 5079, CAJ 5087	CAJ 5203, CAJ 5104
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	N/A*	CAJ 6004
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046, CAJ 7051, WJ 7021, WJ 7022	CAJ 7003, CAJ 7021	CAJ 7027, CAJ 7023, WJ 7007	CAJ 7079, CAJ 7078
MIXED PENETRANTS	1	CAJ 8041, CAJ 8056, WJ 8007	CAJ 8001, CAJ 8013	CAJ 8053, CAJ 1208	CAJ 8118

D. Gypsum Wallboard Assemblies:

GYPSUM WALLBOARD ASSEMBLIES		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	F-RATING (HR)	HILTI	3M	STI	NELSON
METAL PIPES OR CONDUIT	1	WL 1054 WL 1058 WL 1164	WL 1146	WL 1049 WL 1078	WL 1276
NON-METALLIC PIPE OR CONDUIT	1	WL 2078 WL 2075 WL 2128	WL 2088 WL 2002	WL 2074 WL 2059	WL 2291 WL 2306
SINGLE OR BUNDLED CABLES	1	WL 3065 WL 3111 WL 3112	WL 3032 WL 3030	WL 3132, WL 3134	WL 3204 WL 3202
CABLE TRAY	1	WL 4011 WL 4019	WL 4004	WL 4005 WL 4008	WL 4003
INSULATED PIPES	1	WL 5028 WL 5029 WL 5047	WL 5040 WL 5001 WL 5032	WL 5033 WL 5054 WL 5091	WL 5161 WL 5178
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7017 WL 7040 WL 7042	WL 7008	WL 7025 WL 7019 WL 7009	WL 7084 WL 7085
MIXED PENETRANTS	1	WL 1095 WL 8013	WL 8010	WL 8003 WL 8011	N/A*

END OF SECTION 07841

SECTION 07842

FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes fire-resistive joint systems for the following:
 - 1. Head-of-wall joints.
 - 2. Wall-to-wall joints.
- B. See Fire-Resistive Joint System Schedule at end of Part 3.
- C. Related Sections include the following:
 - 1. Division 7 Section "Through-Penetration Firestop Systems" for systems installed in openings in walls and floors with and without penetrating items.
 - 2. Division 7 Section "Joint Sealants" for non-fire-resistive joint sealants.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.
- B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
- C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 3, as determined by NFPA 285 and UL 2079.
 - 1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
- D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
- C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.
- F. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
 - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration

or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.08 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.

2.02 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with

requirements for joint configurations, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.03 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

- B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.
 - 1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.
- D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.05 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.06 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.
- B. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG:
- C. Head-of-Wall Fire-Resistive Joint Systems: As indicated on Drawings or comparable assembly by another manufacturer.
 - 1. Available UL-Classified Systems: HW-D series.
 - 2. Assembly Rating: Matching wall rating.
 - 3. Nominal Joint Width: As indicated.
- D. Wall-to-Wall Fire-Resistive Joint Systems: As indicated on Drawings or comparable assembly by another manufacturer.
 - 1. Available UL-Classified Systems: WW-D series.
 - 2. Assembly Rating: Matching wall rating.
 - 3. Nominal Joint Width: As indicated.

END OF SECTION 07842

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior Joints in Vertical and Horizontal Nontraffic Surfaces:

Joint Type	Surface Materials	Sealant Type	Sealant Color
Construction, isolation, contraction and expansion joints (not immersed)	In cast-in-place concrete (not slabs).	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Construction, isolation, contraction and expansion joints (immersed)	In cast-in-place concrete (not slabs).	Multicomponent nonsag immersible urethane sealant	As selected by Architect from manufacturer's full range
Construction, isolation, contraction and expansion joints (not immersed)	In cast-in-place concrete slabs to vertical concrete and masonry surfaces.	Single-component pourable urethane sealant or Multicomponent pourable urethane sealant	As selected by Architect from manufacturer's full range
Construction, isolation, contraction and expansion joints (immersed)	In cast-in-place concrete slabs at trenches and below grade pits.	Multicomponent pourable immersible urethane sealant	As selected by Architect from manufacturer's full range
Butt joints	Between plant-precast structural concrete units.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Control, expansion and contraction joints	In unit masonry.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Butt and lap joints	Between metal panels, trim and accessories (coil coated paint finish).	Single-component neutral-curing silicone sealant or Single-component neutral-curing silicone sealant	As selected by Architect from manufacturer's full range
Butt and lap joints	Between metal panels, trim and accessories (galvanized and anodized finishes).	Single-component neutral-curing silicone sealant or Single-component neutral-curing silicone sealant	As selected by Architect from manufacturer's full range

Joint Type	Surface Materials	Sealant Type	Sealant Color
Butt and lap joints	Between metal panels, trim and accessories (field painted finish).	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Perimeter joints	Between frames of steel structure, metal doors and windows and the following: concrete and masonry	Use sealant specified above for non-metal surface material	As selected by Architect from manufacturer's full range
Perimeter joints	Between frames of steel structure, metal doors and windows and the following: metal panels, trim, accessories and framing	Use sealant specified above for metal surface material	As selected by Architect from manufacturer's full range

2. Exterior Joints in Horizontal Traffic Surfaces:

Joint Type	Surface Materials	Sealant Type	Sealant Color
Isolation, contraction and expansion joints (not continuously immersed)	In cast-in-place concrete slabs to vertical concrete and masonry surfaces.	Single-component pourable urethane sealant or Multicomponent pourable urethane sealant	As selected by Architect from manufacturer's full range
Isolation, contraction and expansion joints (continually immersed)	In cast-in-place concrete slabs and metal pitch pockets	Multicomponent pourable immersible urethane sealant	As selected by Architect from manufacturer's full range

3. Interior Joints in Vertical and Horizontal Nontraffic Surfaces:

Joint Type	Surface Materials	Sealant Type	Sealant Color
Expansion joints	On exposed surfaces of cast-in-place concrete walls and partitions.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant.	As selected by Architect from manufacturer's full range
Construction isolation and contraction joints	On exposed surfaces of cast-in-place concrete walls and partitions.	Single-component nonsag urethane sealant, Multicomponent nonsag urethane sealant, or Latex sealant.	As selected by Architect from manufacturer's full range
Butt joints	On exposed underside surfaces of plant-precast structural concrete planks.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant.	As selected by Architect from manufacturer's full range
Control, expansion and contraction joints	On exposed surfaces of unit masonry walls and partitions.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range

Joint Type	Surface Materials	Sealant Type	Sealant Color
Control and expansion joints	On exposed interior surfaces of exterior walls.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Perimeter joints	Between interior wall surfaces and frames of interior doors and borrowed lites.	Latex sealant.	As selected by Architect from manufacturer's full range
Perimeter joints	Between interior surfaces of exteriors walls and frames of exterior doors and windows.	Single-component nonsag urethane sealant or Multicomponent nonsag urethane sealant	As selected by Architect from manufacturer's full range
Joints all around penetrations and abutments.	Between ceramic plumbing fixtures and adjoining walls, floors, and counters.	Single-component mildew-resistant neutral or acid-curing silicone sealant	As selected by Architect from manufacturer's full range
Joints all around penetrations and abutments.	Joints between metallic plumbing fixtures and adjoining walls, floors, and counters.	Single-component mildew-resistant neutral-curing silicone sealant	As selected by Architect from manufacturer's full range

4. Interior Joints in Horizontal Traffic Surfaces:

Joint Type	Surface Materials	Sealant Type	Sealant Color
Construction, isolation, contraction and expansion joints (not immersed)	In cast-in-place concrete slabs	Single-component pourable urethane sealant or Multicomponent pourable urethane sealant	As selected by Architect from manufacturer's full range

B. Related Sections include the following:

1. Division 2 Sections "Bituminous Surfacing" and "Site concrete Work" for sealing joints in pavements, walkways, and curbing.
2. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
3. Division 7 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
4. Division 8 Section "Glazing" for glazing sealants.
5. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
6. Division 9 Section "Ceramic Tile" for sealing tile joints.
7. Division 9 Section "Resinous Flooring" for sealing joints control and expansion joint in resinous flooring finish.
8. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.04 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Field Test Report Log: For each elastomeric sealant application.
- G. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of nonelastomeric sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

- a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
- 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.07 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
- 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
- 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.02 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

2.03 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Multicomponent Nonsag Neutral-Curing Silicone Sealant:
 - 1. Available Products:
 - a. Dow Corning Corporation; 756 H.P.
 - 2. Type and Grade: M (multicomponent) and P (pourable).
 - 3. Class: 50.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
- D. Single-Component Neutral-Curing Silicone Sealant:
 - 1. Available Products:
 - a. GE Silicones; SilPruf SCS2000.
 - b. Pecora Corporation; 864, 890.
 - c. Polymeric Systems Inc.; PSI-641.
 - d. Sonneborn, Division of ChemRex Inc.; Omniseal.
 - e. Tremco; Spectrem 3.
 - f. Dow Corning Corporation; 791, 795
 - g. GE Silicones; SilPruf NB SCS9000, UltraPruf II SCS2900.
 - h. Pecora Corporation; 865, 895, 898.
 - 2. Type and Grade: S (single component) and NS (nonsag).

3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

E. Single-Component Neutral-Curing Silicone Sealant:

1. Available Products:
 - a. Dow Corning Corporation; 799.
 - b. GE Silicones; UltraGlaze SSG4000, SSG4000AC.
 - c. Polymeric Systems Inc.; PSI-631.
 - d. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
 - e. Tremco; Proglaze SG, Spectrem 2, Tremsil 600.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

F. Single-Component Acid-Curing Silicone Sealant:

1. Available Products:
 - a. Bostik Findley; Chem-Calk 1200.
 - b. Dow Corning Corporation; 999-A, Trademate Glazing.
 - c. GE Silicones; Construction SCS1200, Contractors SCS1000, Sanitary SCS1700.
 - d. Pecora Corporation; 860.
 - e. Polymeric Systems Inc.; PSI-601, PSI-613.
 - f. Schnee-Morehead, Inc.; SM5732 Polyglaze.
 - g. Sonneborn, Division of ChemRex Inc.; OmniPlus.
 - h. Tremco; Proglaze, Tremsil 200.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:

1. Available Products:
 - a. Pecora Corporation; 898.
 - b. Tremco; Tremsil 600 White.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).

5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

H. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Available Products:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. Tremco; Tremsil 200.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

I. Multicomponent Nonsag Urethane Sealant:

1. Available Products:
 - a. Pecora Corporation; Dynatrol II.
 - b. Tremco; Dymeric 511, Vulkem 922.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 50.
4. Uses Related to Exposure: NT (nontraffic) and T (traffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

J. Multicomponent Nonsag Urethane Sealant:

1. Available Products:
 - a. Schnee-Morehead, Inc.; Permathane SM 7200.
 - b. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 - c. Sonneborn, Division of ChemRex Inc.; NP 2.
 - d. Tremco; Vulkem 227, Vulkem 322 DS.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

K. Multicomponent Nonsag Urethane Sealant: Use the following for expansion joints.

1. Available Products:
 - a. Tremco; Dymeric.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.

4. Additional Movement Capability: 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement.
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

L. Multicomponent Nonsag Urethane Sealant:

1. Available Products:
 - a. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type II (Gun Grade), Elasto-Thane 227 Type II (Gun Grade).
 - b. Pecora Corporation; Dynatred.
 - c. Polymeric Systems Inc.; PSI-270.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

M. Multicomponent Nonsag Immersible Urethane Sealant:

1. Available Products:
 - a. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
 - b. Pecora Corporation; Dynatred.
 - c. Tremco; Vulkem 227, Vulkem 322 DS.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: NT (nontraffic) and I (immersible), Class 1.
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

N. Multicomponent Pourable Urethane Sealant:

1. Available Products:
 - a. Bostik Findley; Chem-Calk 550.
 - b. Meadows, W. R., Inc.; POURTHANE.
 - c. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling), Elasto-Thane 227 Type I (Self Leveling).
 - d. Pecora Corporation; Urexpan NR-200.
 - e. Polymeric Systems Inc.; PSI-270SL.
 - f. Schnee-Morehead, Inc.; Permathane SM 7201.
 - g. Tremco; THC-901, THC-900, Vulkem 245.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

O. Multicomponent Pourable Urethane Sealant:

1. Available Products:
 - a. Pecora Corporation; Dynatrol II-SG.
 - b. Sika Corporation, Inc.; Sikaflex - 2c SL.
 - c. Sonneborn, Division of ChemRex Inc.; SL 2.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

P. Multicomponent Pourable Immersible Urethane Sealant:

1. Available Products:
 - a. Tremco; Vulkem 245.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and I (immersible), Class 1.
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

Q. Single-Component Nonsag Urethane Sealant:

1. Available Products:
 - a. Sika Corporation, Inc.; Sikaflex - 1a.
 - b. Sonneborn, Division of ChemRex Inc.; Ultra, NP 1.
 - c. Tremco; Vulkem 116.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

R. Single-Component Nonsag Urethane Sealant:

1. Available Products:
 - a. Bostik Findley; Chem-Calk 900, Chem-Calk 915, Chem-Calk 916 Textured, Chem-Calk 2639.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Polymeric Systems Inc.; Flexiprene 1000, PSI-901.
 - d. Schnee-Morehead, Inc.; Permathane SM7100, Permathane SM7108, Permathane SM7110.
 - e. Tremco; DyMonic.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.

4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

S. Multicomponent Nonsag Immersible Urethane Sealant:

1. Available Products:
 - a. Tremco; Vulkem 116.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic) and I (immersible), Class 1.
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

T. Single-Component Pourable Urethane Sealant:

1. Available Products:
 - a. Sika Corporation, Inc.; Sikaflex - 1CSL.
 - b. Sonneborn, Division of ChemRex Inc.; SL 1.
2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

U. Single-Component Pourable Urethane Sealant:

1. Available Products:
 - a. Bostik Findley; Chem-Calk 950.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Polymeric Systems Inc.; Flexiprene 952.
 - d. Schnee-Morehead, Inc.; Permathane SM7101.
 - e. Tremco; Tremflex S/L, Vulkem 45.
2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.04 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

B. Available Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.

3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

2.05 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type indicated below, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Exterior and Interior Wet; Horizontal and Vertical Applications: C (closed-cell material with a surface skin).
 2. Interior Dry; Vertical Applications: O (open-cell material).
 3. Vertical Exterior and Interior Wet or Dry Applications: B (bicellular material with a surface skin)
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.06 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. **Surface Cleaning of Joints:** Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. **Joint Priming:** Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. **Masking Tape:** Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. **General:** Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. **Sealant Installation Standard:** Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. **Install sealant backings** of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth per Figure 5C in ASTM C 1193.
 - a. Application: Where joint is sealed behind weep holes.
 6. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.04 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07920

SECTION 08111

STANDARD STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following units manufactured according to "Standard Steel Doors And Frames" (SDI) standards:
- B. The following table indicates steel and door frame units that shall conform to SDI Standards. See Division 8 Section "Custom Steel Doors And Frames" for units indicated to conform to HMMA Standards.

Steel & Door Frame Unit Location	Steel Doors	Steel Door Frames	Sidelite Frames	Borrowed Lite Frames	Louvers	Stops & Moldings
Operations Building						
Interior Walls, not Parking Garage Interior	SDI	SDI	SDI	SDI	-	SDI
Exterior Walls and Parking Garage Interior	HMMA	HMMA	HMMA	HMMA	-	HMMA
Maintenance Building						
Interior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Exterior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Service Facility						
Interior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Exterior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA

- C. Related Sections include the following:
1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting standard steel frames in masonry construction.
 2. Division 8 Section "Custom Steel Doors And Frames" for units fabricated to HMMA standards.
 3. Division 8 Section "Glazing" for glazed lites in standard steel doors and frames.
 4. Division 8 Section "Door Hardware" for door hardware for standard steel doors.
 5. Division 9 painting Sections for field painting standard steel doors and frames.

1.03 DEFINITIONS

- A. Uncoated steel sheet thicknesses are indicated as the minimum decimal inch thickness according to the following table (The table below is derived from HMMA 803-97,

Steel Tables and an article, "National Cold-Formed Associations Approve a Common Stud Designator System," published in the Newsletter for the Light Gauge Steel Engineers Associations, October 1996 edition.)

Gauge	Decimal Inch		Gauge	Decimal Inch		Gauge	Decimal Inch
4	0.214		10	0.123		20	0.032
5	0.199		12	0.093		22	0.026
6	0.184		14	0.067		24	0.020
7	0.167		16	0.053		26	0.016
8	0.152		18	0.042		28	0.013

- B. Metallic-coated steel sheet thicknesses are indicated as the minimum decimal inch thickness of the uncoated base metal.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance and finishes for each type of steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details.
 3. Frame details for each frame type, including dimensioned profiles.
 4. Details and locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, accessories, joints, and connections.
 7. Details of glazing frames and stops showing glazing.
 8. Details of conduit and preparations for electrified door hardware and controls.
- C. Coordination Drawings: Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations for power, signal, and electrified control systems.
- D. Qualification Data: For Installer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.
- C. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
2. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Amweld Building Products, LLC.
 2. Benchmark Doors; a division of General Products Co., Inc.
 3. Ceco Door Products; an ASSA ABLOY Group Company.
 4. CURRIES Company; an ASSA ABLOY Group Company.

5. Pioneer Industries, Inc.
6. Steelcraft; an Ingersoll-Rand Company.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
- F. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."
- G. Glazing: Comply with requirements in Division 8 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
 1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
 3. Vertical Edges for Single-Acting Doors: Manufacturer's beveled or square edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick (14 gauge).
 - 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick (14 gauge).
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.04 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 - 2. Frames for Level 2 Steel Doors: 0.053 inch thick (16 gauge) steel sheet.
 - 3. Frames for Wood Doors: 0.053 inch thick (16 gauge) steel sheet.
 - 4. Frames for Borrowed Lights: 0.042 inch thick (18 gauge) steel sheet.
- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick (14 gauge).
 - 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick (14 gauge).
- D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- E. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick (18 gauge), with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick (18 gauge).
 - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- F. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick (18 gauge), and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- G. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- H. Plaster Guards: Formed from same material as frames, not less than 0.016-inch thick.

2.05 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick (20 gauge), fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick (20 gauge), fabricated from same material as frames in which they are installed.

2.06 FABRICATION

- A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Glazed Lites in Standard Steel Doors: Factory cut openings in doors.
- C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
 - 4. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
 - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.

- 3) Four anchors per jamb from 90 to 120 inches in height.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.
- b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
- 1) Three anchors per jamb up to 60 inches in height.
 - 2) Four anchors per jamb from 60 to 90 inches in height.
 - 3) Five anchors per jamb from 90 to 96 inches in height.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- c. Compression Type: Not less than two anchors in each jamb.
- d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of doors and frames.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.07 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish standard steel door and frames after assembly.
- B. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Standard Steel Frames: Install standard steel frames for doors, sidelights, transoms, borrowed lights and other openings, of size and profile indicated. Comply with SDI 105.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
 - 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 7. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

- b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

END OF SECTION 08111

SECTION 08114

CUSTOM STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes units manufactured according to the "Hollow Metal Manufacturers Association" (HMMA) standards for the following:
- B. The following table indicates steel and door frame units that shall conform to HMMA Standards. See Division 8 Section "Standard Steel Doors And Frames" for units indicated to conform to SDI Standards.

Steel & Door Frame Unit Location	Steel Doors	Steel Door Frames	Sidelite Frames	Borrowed Lite Frames	Louvers	Stops & Moldings
Operations Building						
Interior Walls, not Parking Garage Interior	SDI	SDI	SDI	SDI	-	SDI
Exterior Walls and Parking Garage Interior	HMMA	HMMA	HMMA	HMMA	-	HMMA
Maintenance Building						
Interior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Exterior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Service Facility						
Interior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA
Exterior Walls	HMMA	HMMA	HMMA	HMMA	-	HMMA

- C. Related Sections include the following:
1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting custom steel frames in masonry construction.
 2. Division 8 Section "Standard Steel Doors And Frames" for units fabricated according to SDI standards.
 3. Division 8 Section "Glazing" for glazed lites in custom steel doors and frames.
 4. Division 8 Sections for door hardware for custom steel doors.
 5. Division 9 painting Sections for field painting custom steel doors and frames.

1.03 DEFINITIONS

- A. Uncoated steel sheet thicknesses are indicated as the minimum decimal inch thickness according to the following table (The table below is derived from HMMA 803-97,

Steel Tables and an article, "National Cold-Formed Associations Approve a Common Stud Designator System," published in the Newsletter for the Light Gauge Steel Engineers Associations, October 1996 edition.)

Gage	Decimal Inch		Gage	Decimal Inch		Gage	Decimal Inch
4	0.214		10	0.123		20	0.032
5	0.199		12	0.093		22	0.026
6	0.184		14	0.067		24	0.020
7	0.167		16	0.053		26	0.016
8	0.152		18	0.042		28	0.013

- B. Metallic-coated steel sheet thicknesses are indicated as the minimum decimal inch thickness of the uncoated base metal.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating and finishes for each type of custom steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of custom steel doors and frames using same reference numbers for details and openings as those on Drawings:
1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details.
 3. Frame details for each frame type, including dimensioned profiles.
 4. Details and locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, accessories, joints, and connections.
 7. Details of glazing frames and stops showing glazing.
 8. Details of conduit and preparations for electrified door hardware and controls.
- C. Coordination Drawings: Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations for power, signal, and electrified control systems.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of custom steel door and frame.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain custom steel doors and frames through one source from a single manufacturer.

- C. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
 - 1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 - a. Specifications shall be cross-referenced and coordinated with hardware and door panel manufacturers to ensure that total opening engineering is compatible with testing standards indicated above.
 - b. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.
 - c. Special smoke seal, if required for "S" labeling, shall be supplied by door assembly supplier.
- D. Fire-Rated Borrowed Lites
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high, wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 - 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating custom steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for custom steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves,

concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Amweld Building Products, LLC.
 2. Benchmark Doors; a division of General Products Co., Inc.
 3. Ceco Door Products; an ASSA ABLOY Group Company.
 4. CURRIES Company; an ASSA ABLOY Group Company.
 5. Pioneer Industries, Inc.
 6. Steelcraft; an Ingersoll-Rand Company.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching custom steel door frames of type indicated.
- G. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 8 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 CUSTOM STEEL DOORS

- A. General: Provide doors of design indicated, not less than 1-3/4 inches thick, of seamless hollow construction, unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces.
1. Design: Flush panel.
- B. Door Face Sheets:
1. Exterior Doors: Fabricated from minimum 0.053 inch thick (16 gauge), metallic-coated steel sheet.
 2. Doors in Bus Wash M101: Fabricated from minimum 0.042 inch thick (18 gauge), metallic-coated steel sheet.
 3. Interior Doors: Fabricated from minimum 0.042 inch thick (18 gauge), cold-rolled steel sheet.
- C. Core Construction: Fabricate doors with one of following cores indicated. Provide thermal-resistance-rated cores for exterior doors and Door in Bus Wash M101.
1. Steel-Stiffened Core: 0.026 inch thick (22 gauge), steel vertical stiffeners extending full-door height, with vertical webs spaced not more than 6 inches apart, spot welded to face sheets a maximum of 5 inches o.c. Spaces filled between stiffeners with glass- or mineral-fiber insulation.
 2. Laminated Core: Resin-impregnated kraft paper with maximum 1-inch cells, or foam-plastic insulation, as standard with manufacturer; fastened to face sheets with waterproof adhesive.
 3. Laminated Honeycomb Core: Resin-impregnated kraft paper with maximum 1-inch cells; fastened to face sheets with waterproof adhesive.
 4. Laminated Foam-Plastic Core: Fastened to face sheets with waterproof adhesive.
 - a. Polystyrene Board: ASTM C 578, Type I, with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft/Btu when tested according to ASTM C 1363.
 5. Laminated Steel-Stiffened Core: 0.026 inch thick (22 gauge), steel vertical stiffeners extending full-door height, with vertical webs spaced not more than 6 inches apart, fastened to face sheets with waterproof adhesive. Spaces filled between stiffeners with glass- or mineral-fiber insulation.
 6. Fire-Rated Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
- D. Top and Bottom Channels: Minimum 0.053 inch thick (16 gauge), steel channel spot welded, not more than 6 inches o.c., to face sheets.
1. Tops and bottoms of doors reinforced with inverted horizontal channels, continuous across full width of door, of same material as face sheets so flanges of channels are even with bottom and top edges of face sheets.
 2. Top and bottom edges of following doors closed with closing channels of same material and thickness as face sheets; welded so webs of channels are flush with door edges.
 - a. Exterior doors.
 - b. Doors in Bus Wash M101.

- E. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
 - 1. Hinges and Pivots: Minimum 0.167 inch thick (7 gauge) by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.093 inch thick (12 gauge).
 - 3. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick (14 gauge).
- F. Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors.
 - 1. Where indicated for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than 6 inches o.c.

2.04 CUSTOM STEEL PANELS

- A. Provide custom steel panels of same materials, construction, and finish as specified for adjoining custom steel doors.

2.05 CUSTOM STEEL FRAMES

- A. General: Fabricate frames of construction indicated, with faces of corners mitered and contact edges closed tight.
 - 1. Frames for Doors: Welded.
 - 2. Sidelight, Transom and Borrowed-Light Frames: Welded.
 - 3. Door Frames: Fabricated from 0.067 inch thick (14 gauge) steel sheet.
 - 4. Sidelight and Transom Frames: Fabricated from same material as adjacent door frame.
 - 5. Borrowed-Light Frames: Fabricated from 0.053 inch thick (16 gauge) steel sheet.
- B. Exterior Frames and Frames in Bus Wash M101: Formed from metallic-coated steel sheet.
- C. Interior Frames: Formed from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges and Pivots: Minimum 0.167 inch thick (7 gauge) by 1-1/4 inches wide by 10 inches long, secured by not less than 6 spot welds.
 - 2. Strikes, Flush Bolts, Hold-Open Arms, and Closers: Minimum 0.093 inch thick (12 gauge).
 - 3. Surface-Mounted Hardware: Minimum 0.093 inch thick (12 gauge).
- E. Head Reinforcement: Minimum 0.093 inch thick (12 gauge), steel channel or angle stiffener.

F. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.053 inch thick (16 gauge), with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick (18 gauge).
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

G. Floor Anchors: Formed from same material as frames, not less than 0.067 inch thick (14 gauge), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

H. Plaster Guards: Formed from same material as frames, not less than 0.016 inch thick (26 gauge).

2.06 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick (20 gauge), fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with custom steel frames, minimum 5/8 inch high, unless otherwise indicated.
- C. Loose Stops for Glazed Lites and Solid Panels in Frames: Minimum 0.032 inch thick (20 gauge), fabricated from same material as frames in which they are installed.

2.07 FABRICATION

- A. General: Fabricate custom steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Custom Steel Doors: Comply with ANSI A250.4, Level A.
 1. Weep-Holes: Provide weep-hole openings in bottom of following doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - a. Exterior doors.
 - b. Doors in Bus Wash M101.
 2. Glazed Lites: Factory cut openings in doors.
 3. Visible joints or seams around glazed lite inserts are permitted.
 4. Single-Acting Doors: Bevel both vertical edges 1/8 inch in 2 inches.

5. Edges: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
- C. Custom Steel Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Mullion, Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints. Fasten members at crossings and to jambs by butt welding according to joint designs in HMMA 820.
 - a. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
 3. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
 4. Where installed in masonry, leave vertical mullions in frames open at top for grouting.
 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.
 - 3) Four anchors per jamb from 90 to 96 inches in height.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches in height.
 - 2) Four anchors per jamb from 60 to 90 inches in height.
 - 3) Five anchors per jamb from 90 to 96 inches in height.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 7. Head Reinforcement: For frames more than 48 inches wide, provide continuous head reinforcement for full width of opening, welded to back of frame at head.
 8. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Hardware Preparation: Factory prepare custom steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
- 1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 - 2. Locate door hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
- E. Stops and Moldings: Provide stops and moldings around glazed lites and solid panels where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
- 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each lite is capable of being removed independently.
 - 3. Coordinate rabbet width between fixed and removable stops with type of glazing or panel and type of installation indicated.

2.08 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 1. Finish custom steel door and frames after assembly.
- B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
- 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
- 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by

primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of custom steel doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of custom steel frame connections before frame installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace custom steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Provide doors of sizes, thicknesses, and designs indicated. Install custom steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Custom Steel Frames: Install custom steel frames for doors, sidelights, transoms, borrowed lights and other openings, of size and profile indicated.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint

- continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors, if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Installation Tolerances: Adjust custom steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Custom Steel Doors: Fit hollow-metal doors accurately in frames, within clearances indicated below. Shim as necessary.
1. Non-Fire-Rated Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with custom steel door and frame manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including custom steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off custom steel doors and frames immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08114

SECTION 08311

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Wall access doors and frames.
- B. Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry Assemblies" for anchoring and grouting access door frames set in masonry construction.
 - 2. Division 7 Section "Roof Accessories" for roof hatches.
 - 3. Division 15 Section "Air Conditioning" for heating and air-conditioning duct access doors and Section "Air Compressor And Dryers" for access doors associated with this equipment.
 - 4. Division 15 Section "Plumbing" for connection of floor door drainage couplings to drains.

1.03 SUBMITTALS

- A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, and finishes for access doors and frames.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.05 COORDINATION

- A. Verification: See Mechanical Drawings for specific locations and sizes for access doors needed to gain access to concealed equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited

to, the following:

1. Bar-Co, Inc. Div.; Alfab, Inc.
2. Cesco Products.
3. Jensen Industries.
4. J. L. Industries, Inc.
5. Karp Associates, Inc.
6. Larsen's Manufacturing Company.
7. MIFAB Manufacturing, Inc.
8. Milcor Limited Partnership.
9. Nystrom Building Products Co.

2.02 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.
- C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), with Class C coating and phosphate treatment to prepare surface for painting; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M for uncoated base metal.
- E. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.

2.03 PAINT

- A. Shop Primer for Metallic-Coated Steel: Organic zinc-rich primer complying with SSPC-Paint 20 and compatible with topcoat.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.04 ACCESS DOORS AND FRAMES

- A. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.
 1. Locations: Masonry, ceramic-tile and gypsum board wall surfaces.
 2. Door: Minimum 0.060 inch thick sheet metal, set flush with exposed face flange of frame.
 3. Frame: Minimum 0.060 inch thick sheet metal with 1 inch to 1-1/4 inch wide,

- surface-mounted trim.
- 4. Hinges: Either spring-loaded concealed pin type or continuous piano hinge.
- 5. Latch: Screwdriver operated cam latch.
- 6. Size: As indicated on Mechanical Drawings.

2.05 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: As indicated.
 - 2. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction. Furnish adjustable metal masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.06 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.07 METALLIC-COATED STEEL FINISHES

- A. Galvanizing of Steel Shapes and Plates: Hot-dip galvanize items indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. For galvanized surfaces, apply, after cleaning, a conversion coating suited to the organic coating to be applied over it. For metallic-coated surfaces, clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Factory Priming for Field-Painted Finish: Apply shop primer immediately after cleaning and pretreating.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.02 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08331

EXTERIOR OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following types of overhead coiling doors:
 - 1. Insulated service doors, electrically power operated, non-fire rated.
 - 2. Electrical connection to power service junction box.
- B. Related Sections: The following Sections contain requirements that may relate to this Section:
 - 1. Division 5 Section "Metal Fabrication" for steel door opening framing.
 - 2. Division 8 Section "Interior Overhead Coiling Doors" for units not exposed to the exterior.
 - 3. Division 16 Sections "Basic Electrical Requirements" and "Electrical Basic Materials And Methods."

1.03 DEFINITIONS

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.04 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
- B. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles and for 10 cycles per day.

1.05 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - 1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - 2. Summary of forces and loads on walls and jambs.

3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied finishes.
- D. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 1. Curtain Slats: 12-inch length.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.06 QUALITY ASSURANCE

- A. Single Source Responsibility: Manufacturer of doors specified in this Section shall be same as manufacturer of doors specified in Division 8 Section "Interior Overhead Coiling Doors."
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
 1. Obtain operators and controls from the overhead coiling door manufacturer.
- D. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Overhead Door Corporation.
2. The Cookson Company.
3. Cornell Iron Works Inc.

2.02 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material thickness recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Steel Door Curtain Slats: Structural-quality, cold-rolled galvanized steel sheets complying with ASTM A 653, with G90 zinc coating.
 - a. Provide manufacturer's standard flat-profile slats.
 - b. Finish: Factory painted.
 2. Insulation: Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation complying with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within metal slat faces.
 3. Inside Curtain Slat Face: To match material of outside metal curtain slat and as follows:
 - a. Galvanized Steel Sheet Thickness: Not less than 0.028 inch.
 - b. Finish: Factory painted.
- B. Endlocks: Malleable-iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets, or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Windlocks: Malleable-iron castings secured to curtain slats with galvanized rivets or high-strength nylon, as required to comply with wind load.
- D. Bottom Bar: Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick, either galvanized or stainless-steel or aluminum extrusions to suit type of curtain slats.
1. Provide motor-operated doors with combination bottom astragal and sensor edge.
- E. Curtain Jamb Guides: Fabricate curtain jamb guides of steel angles, or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch-thick, galvanized steel sections complying with ASTM A 36, and ASTM A 123. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain and a continuous bar for holding windlocks.

2.03 HOODS AND ACCESSORIES

- A. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head and act as weatherseal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-

mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.

1. Fabricate steel hoods, for steel doors, of not less than 0.028-inch thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653.
 2. Shape: Round.
 3. Finish: Prime for field finish.
- B. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and at top of exterior doors, unless otherwise indicated. At door head, use 1/8 inch thick, replaceable, continuous sheet secured to inside of curtain coil hood.
1. Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 2. In addition, provide replaceable, adjustable, continuous, flexible, 1/8 inch thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.
- C. Windows: Provide windows of 1/4 inch clear, transparent acrylic sheet, of size and in arrangement shown. Set glazing in vinyl, rubber or neoprene glazing channel secured to curtain slats.
- D. Chain Lock Keeper: Suitable for padlock.

2.04 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2.05 MANUAL DOOR OPERATORS

- A. Provide manual chain-hoist operators unless electric door operators are indicated.
- B. Chain-Hoist Operator: Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum

35 pounds force for door operation. Provide alloy steel hand chain with chain holder secured to operator guide.

2.06 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
- B. Comply with NFPA 70.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 - 1. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- D. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
- E. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain-hoist and floor level disconnect.
- F. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps or more than 1 fps, without exceeding nameplate ratings or considering service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
 - a. Where power service supply to motor is multi-phased, include an integral device protecting door's electrical motor and other electrical equipment from damage in the event that one or more phases are dropped from the building's electrical power supply service.
 - 4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
 - a. At vehicle wash bays provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.

- G. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - a. At vehicle wash bays provide exterior type units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- H. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.
 - 2. Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Provide electrically actuated automatic bottom bar.
- I. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

2.07 FINISHES, GENERAL

- A. General: Comply with National Association of Architectural Metal Manufacturers (NAAMM's) "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.08 STEEL AND GALVANIZED STEEL FINISHES

- A. Provide either of following finishes at Contractor's option:
 - 1. Baked Finish: Manufacturer's standard baked finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
 - 2. Powder-Coat Finish: Manufacturer's standard powder-coat finish consisting of primer and topcoat according to coating manufacturer's written instructions for

- cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
3. Color and Gloss: Match color indicated on Drawing's Finish Legend.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
- B. Electrical Installation and Connections:
 1. Install and connect all electrical door components beginning at and downline from electrical service power junction box indicated on Electrical Drawings.
 2. All wire shall be run through electrical metal tubing (EMT) and metal junction boxes. Comply with requirements specified in Division 16 Sections "Basic Electrical Requirements" and "Electrical Basic Materials And Methods."

3.02 TESTING AND ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.
- B. Test electrically powered door systems. Adjust to conform to door manufacturer's written recommendations.

3.03 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 3. Review data in the maintenance manuals. Refer to Division 1 Section "Closeout Procedures" for operation and maintenance data.
 4. Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION 08331

SECTION 08332

INTERIOR OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following types of interior overhead coiling doors:
 - 1. Fire-rated counter doors, electric-motor-operated for locations including the following:
 - 2. Fire-rated service doors, electric-motor-operated for locations including the following:
 - 3. Electrical connection to power service junction box and fire alarm system.
- B. Related Sections: The following Sections contain requirements that may relate to this Section:
 - 1. Division 5 Section "Metal Fabrication" for steel door opening framing.
 - 2. Division 8 Section "Exterior Overhead Coiling Doors" for units exposed to the exterior.
 - 3. Division 8 Section "Sectional Overhead Doors" for steel solid panel sectional units.
 - 4. Division 8 Section "Glazed Aluminum Sectional Overhead Doors" for glazed sectional units.
 - 5. Division 16 Sections "Basic Electrical Requirements," "Electrical Basic Materials And Methods" and "Fire Alarm System."

1.03 DEFINITIONS

- A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.04 PERFORMANCE REQUIREMENTS

- A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles and for 10 cycles per day.

1.05 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - 1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - 2. Fire-Rated Doors: Information describing fire-release system, including testing

and resetting instructions.

- B. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Curtain Slats: 12-inch length.
- C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.06 QUALITY ASSURANCE

- A. Single Source Responsibility: Manufacturer of doors specified in this Section shall be same as manufacturer of doors specified in Division 8 Section "Exterior Overhead Coiling Doors."
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
- D. Fire-Rated Door Assemblies: Provide assemblies complying with NFPA 80 that are identical to door and frame assemblies tested for fire-test-response characteristics per UL 10b, and that are labeled and listed for fire ratings indicated by UL, FM, ITS/Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
 - a. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.
 - b. Special smoke seal, if required for "S" labeling, to be supplied by door assembly supplier.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Overhead Door Corporation.
 - 2. The Cookson Company.
 - 3. Cornell Iron Works Inc.

2.02 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material thickness recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
- B. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel (SS) sheet; complying with American Society for Testing and Materials ASTM A 653/A 653M, G90 (Z275) coating designation.
 - 1. Minimum Base-Metal (Uncoated) Thickness: 0.0209 inch.
 - 2. Flat profile slats.
- C. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304.
 - 1. Minimum Specified Thickness: Not less than 0.025 inch.
 - 2. Flat profile slats.
- D. Endlocks: Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- E. Bottom Bar for Service Doors: Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; galvanized, stainless-steel, or aluminum extrusions to suit type of curtain slats.
- F. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or aluminum extrusions to suit type of curtain slats.
- G. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior doors.
- H. Curtain Jamb Guides for Service Doors: Fabricate curtain jamb guides of steel angles or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16 inch thick galvanized steel sections complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
- I. Curtain Jamb Guides for Counter Doors: Fabricate curtain jamb guides of stainless-steel sheet, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

2.03 HOODS AND ACCESSORIES

- A. Hood: Form to act as weatherseal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to

prevent sagging.

1. Service Doors: Fabricate hoods for steel doors of minimum 0.028 inch thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.
 2. Counter Doors: Fabricate hoods for stainless-steel doors of minimum 0.025 inch thick stainless-steel sheet, Type 304, complying with ASTM A 666.
 3. Counter Doors: Include automatic drop baffle to guard against passage of smoke or flame.
 4. Shape: Round or square as indicated on Drawings.
- B. Fire-Rated Counter: Provide fire-door manufacturer's stainless steel countertop, UL tested and labeled for 1-1/2 hour fire rating for approved use with fire-door assembly.
1. Fabricate to size indicated on Drawings.
- C. Smoke Seals for Fire-Rated Doors: Provide UL-listed and -tested smoke-seal perimeter gaskets.
- D. Chain Lock Keeper: Suitable for padlock.
- E. Provide automatic-closing device that is inoperative during normal door operations, with oscillating or viscous-speed governor unit complying with requirements of NFPA 80 and with an easily tested and reset release mechanism, and designed to be activated by the following:
1. Building fire alarm and detection system and door-holder-release devices.

2.04 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2.05 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended

and provided by door manufacturer for door and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- B. Comply with NFPA 70 National Electrical Code.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 - 1. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- D. Provide control equipment complying with National Electrical Manufacturers Association (NEMA) NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- E. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and auxiliary chain-hoist and floor level disconnect.
- F. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 foot per second or more than 1 foot per second, without exceeding nameplate ratings or considering service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
 - a. Where power service supply to motor is multi-phased, include an integral device protecting door's electrical motor and other electrical equipment from damage in the event that one or more phases are dropped from the building's electrical power supply service.
 - 4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
- G. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

- H. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Provide electrically actuated automatic bottom bar.
- I. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

2.06 FINISHES, GENERAL

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.07 STEEL AND GALVANIZED STEEL FINISHES

- A. Baked Finish: Manufacturer's standard baked finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

2.08 STAINLESS-STEEL FINISHES

- A. General: Remove or blend stretch lines and tool and die marks into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Polish: No. 4 finish.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Electrical Installation and Connections:

1. Install and connect all electrical door components beginning at and downline from electrical service power junction box indicated on Electrical Drawings.
2. Connect fire-rated door assemblies to fire alarm system. Reference Division 16 Section "Fire Alarm System."
3. All wire shall be run through electrical metal tubing (EMT) and metal junction boxes. Comply with requirements specified in Division 16 Sections "Basic Electrical Requirements" and "Electrical Basic Materials And Methods."

3.02 TESTING AND ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.
- B. Test electrically powered door systems. Adjust to conform to door manufacturer's written recommendations.
- C. Test door operation, including fire release, during fire alarm mode. Adjust to conform to door manufacturer's written recommendations and requirements of Division 16 Section "Fire Alarm System."

3.03 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Test door closing when activated by detector or alarm connected fire-release system. Reset door-closing mechanism after successful test.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 3. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 4. Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION 08332

SECTION 08348

FIBERGLASS REINFORCED DOOR AND DOOR FRAME SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Fiberglass Reinforced Plastic (FRP) Doors.
 - 2. Fiberglass Door Frames.
 - 3. Glazing installation.
- B. Products Installed But Not Supplied Under This Section:
 - 1. Glazing is furnished under Division 8 Section "Glazing."
- C. Related Sections include the following
 - 1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting standard FRP frames in masonry construction.
 - 2. Division 8 Section "Glazing" for glazed lites in FRP doors.
 - 3. Division 8 Sections for "Door Hardware" for FRP doors.
 - 4. Division 9 painting Sections for field painting FRP doors and frames.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Door opening assemblies:
 - a. Maximum flame spread 25 in accordance with ASTM E 84, self-extinguishing in accordance with ASTM D 635.
 - b. USDA accepted.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, and finishes for each type of FRP door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of FRP doors and frames using same reference numbers for details and openings as those on Drawings:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details.
 - 3. Frame details for each frame type, including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
 6. Details of anchorages, accessories, joints, and connections.
 7. Details of glazing frames and stops showing glazing.
- C. Coordination Drawings: Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, and locations of door hardware.
 - D. Samples for Initial Selection: For units with factory-applied color finishes.
 - E. Samples for Verification: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
 - F. Manufacturer's Instructions: Printed installation instructions for door opening assemblies.
 - G. Warranty Documents: Manufacturer's standard warranty documents, executed by manufacturer's representative, countersigned by Contractor.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Manufacture's Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain FRP doors and frames through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frame assemblies packaged in manufacturer's standard containers designed to provide protection during transit and Project-site storage.
- B. Store door assemblies in manufacturer's standard containers, in a vertical position, to prevent damage to face corners and edges.
- C. Mark each container with opening number used on Shop Drawings.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating custom steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for FRP frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

1.09 WARRANTY

- A. Special Corrosion Warrant: Manufacturer's standard form in which manufacturer agrees to repair or replace components which fail due to corrosion within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.
- B. Special Materials and Workmanship Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components which fail due to materials and workmanship, including warp, separation or delamination, and expansion of the core.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: Subject to compliance with the requirements provide FRP door and frame assemblies from FIB-R-DOR Division of Advance Fiberglass, Inc. or comparable products by another manufacturer.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 666, austenitic stainless steel, Type indicated.
- B. Fiberglass Mat Weight: Minimum 1.5 ounces per square foot.
- C. Resins: Manufacturer's formulation for fabricating units to meet specified requirements.
- D. Fasteners: Stainless steel.

E. Glazing: Comply with requirements in Division 8 Section "Glazing."

2.03 FRP DOOR UNITS

- A. General: Provide flush panel doors, not less than 1-3/4 inches thick, of seamless construction. Construct doors with smooth surfaces without visible joints or seams on exposed faces.
- B. Non-rated Fiberglass Reinforced Plastic (FRP) Doors:
1. Core Construction: Fabricate doors with core indicated. Provide thermal-resistance-rated cores.
 - a. Thermal Resistance: R 11.
 - b. Core Construction: End-grain balsa wood, resin-impregnated.
 2. Provide minimum glass fiber to resin ratio of not less than 30 percent.
 3. Door Faces (Plates): Molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 1/8 inch thick, minimum 15 mil gel-coated surface.
 4. Door Edges: Minimum 3 layers resin-reinforced glass fiber mat, nominal 3/8 inch thick, machine tooled.
 5. Sizes: Indicated on Drawings.
 6. Face Finish: Smooth gloss surface, minimum value 88 in accordance with ASTM D 523.
 7. Color: As selected by Architect from manufacturer's full range.

2.04 FRP FRAMES

- A. General: Fabricate frames of construction indicated, with faces of corners mitered and contact edges closed tight.
- B. Non-rated Fiberglass Frames:
1. Head and Jamb: One-piece pultruded fiberglass reinforced plastic, minimum 1/4 inch wall thickness, conforming to SDI requirements for performance equivalent to 16 gage steel frames
 2. Joint Reinforcing: FRP clips.
 3. Frame Profile: 5-3/4 inches deep, 2 inches wide face; double rabbeted with 5/8 inch high stop.
 4. Sizes: Indicated on Drawings.
 5. Face Finish: Satin finish, with true and consistent color throughout frame thickness.
 6. Color: As indicated on Drawings.

2.05 FASTENERS, ANCHORS AND REINFORCEMENT

- A. Fasteners: Unless otherwise indicated, provide Type 304 stainless-steel fasteners. Select fasteners for type, grade, and class required.
1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads.

- B. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
- C. Rivet Nuts: Type 304 stainless-steel.
- D. Jamb Anchors: Formed from stainless steel type indicated above.
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.053 inch thick Type 304 stainless-steel, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
- E. Floor Anchors: Formed from not less than 0.067 inch thick Type 304 stainless-steel, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.06 LIGHT FRAMES

- A. Lite Frames in Non-rated Doors:
 - 1. Stops: Pultruded fiberglass reinforced plastic construction.
 - 2. Sizes: Indicated on Drawings.
 - 3. Fasteners: Stainless steel screws.

2.07 DOOR HARDWARE

- A. Door Hardware: Comply with requirements in Division 8 Section "Door Hardware."

2.08 FABRICATION

- A. FRP Frames:
 - 1. Hole Reinforcing: Reinforce fastener holes with stainless-steel rivet nuts, except at locations reinforced with stainless steel backing plate.
 - 2. Miter jamb-to-head joints to produce hairline joint.
- B. Stainless-Steel Anchors and Reinforcing: Fabricate to be concealed from view in finished installation.
 - 1. Floor Anchors: Fabricate to field fasten to bottom of jambs in door stop recess.

- C. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
 - 1. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Hardware Preparation: Factory prepare FRP doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 - 2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of FRP doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of FRP frame connections before frame installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Fabricate spreader bars with length matching inside dimension of header in accordance with manufacturer's written instructions.
- B. Frame Assembly: Field assemble FRP frames in compliance with manufacturer's written instructions. Install fasteners from finished face-side of frame, through FRP frame into metal reinforcement. Select fastener length so that not less than 2 full screw threads are exposed on back side of metal reinforcement.
 - 1. Connect head-to-jamb miter joints to produce hairline joints with exposed faces smooth and flush. Fasten concealed stainless steel joint reinforcement using not less than 2 stainless-steel screws straddling each side of miter joint. Fasten both faces at each miter joint.
 - 2. Floor Anchors: Fasten anchors to bottom of jambs with not less than 2 stainless-steel screws.
- C. Prior to installation of masonry and with installation spreaders in place at threshold and center of FRP door frames, adjust and securely brace frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

D. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install FRP doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. FRP Frames: Install FRP frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Install frames with removable glazing stops located on secure side of opening.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.
 - 3) Four anchors per jamb from 90 to 96 inches in height.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
 5. Installation Tolerances: Adjust FRP door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. FRP Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated FRP Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including FRP doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off FRP doors and frames immediately after installation.

END OF SECTION 08348

SECTION 08362

GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes electrically operated selectively glazed, aluminum, sectional overhead doors with weather seals.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
 - 2. Division 8 Section "Sectional Overhead Doors" for steel solid panel units.
 - 3. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.03 DEFINITIONS

- A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.04 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
 - 2. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.
 - a. Maximum Rate: 0.08 cfm at 15 mph.
- B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

1.05 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead door and accessory. Include the following:
 - 1. Summary of forces and loads on walls and jambs.

2. Motors: Show nameplate data and ratings, characteristics, and mounting arrangements.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 1. Frame: 6 inches long.
 2. Panel: 6 inches square.
- E. Qualification Data: For Installer.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.
 1. Obtain operators and controls from sectional overhead door manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 1 Section "Product Requirements."
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide Clopay Building Products Company; a Griffon Company; Model 901P or comparable product by one of the following:
 1. Raynor.
 2. Wayne-Dalton Corp.

2.02 ALUMINUM DOOR SECTIONS

- A. Construct door sections with extruded-aluminum shapes, complying with ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with wall thickness not less than 0.065 inch for door section 1-3/4 inches deep. Fabricate sections with stile and rail dimensions and profiles shown. Join stiles and rails by welding or with concealed, 1/4-inch- minimum

diameter, aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Form meeting rails to provide a weathertight-seal joint. Provide reinforcement for hardware attachment.

- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.
 - a. Color: As selected by Engineer from manufacturer's full range.

2.03 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653/A 653M for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced at 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
 - 1. Provide tracks configured for the following lift types:
 - a. Standard.
- B. Track Reinforcement and Supports: Galvanized steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
 - 1. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.
 - a. Repair galvanized coating on tracks according to ASTM A 780.
- C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.
 - 1. Provide continuous flexible seals at door jambs for a weathertight installation.
- D. Full-Vision Panels: Manufacturer's standard, tubular, aluminum-framed section fully glazed with 6-mm-thick, clear acrylic glazing set in vinyl, rubber, or neoprene glazing channel and with removable extruded-vinyl or aluminum stops.

2.04 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty galvanized steel hinges of not less than 0.0747-inch- thick, uncoated steel at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.
- C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch- diameter roller tires for 2-inch- wide track.
 - 1. Tire Material: Neoprene or bronze.
- D. Chain Lock Keeper: Suitable for padlock.

2.05 COUNTERBALANCE MECHANISM

- A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from oil-tempered-steel wire complying with ASTM A 229/A 229M, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 10,000 cycles.
- B. Cable Drums: Cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.
- C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.
- D. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.
- E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.06 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- B. Comply with NFPA 70.
- C. Disconnect Device: Hand-operated disconnect device or mechanism for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70, Class 2 control circuit, maximum 24-V, ac or dc.
- F. Door-Operator Type: Unit consisting of electric motor and the following:
 - 1. Jackshaft hoist type, with V-belt primary-drive reduction, chain-drive intermediate reduction, roller-chain final drive connected to counterbalance shaft, auxiliary chain hoist, and floor-level quick release for manual operation.
- G. Electric Motors: High-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: Comply with NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 - 4. Provide totally enclosed, nonventilated or fan-cooled motor, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.
- H. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide full-guarded, standard-duty, surface-mounted, weatherproof-type exterior unit with NEMA ICS 6, Type 4, key-operated control station enclosure.
- I. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
- J. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
- B. Fasten vertical track assembly to framing, spaced not less than 24 inches apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened to framing by welding or bolting or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.02 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup services.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.03 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weathertight fit around entire perimeter.
- B. Adjust belt-driven motors as follows:
 - 1. Use adjustable motor-mounting bases for belt-driven motors.
 - 2. Align pulleys and install belts.
 - 3. Tension belt according to manufacturer's written instructions.
- C. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.04 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional overhead doors. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION 08362

SECTION 08411

ALUMINUM-FRAMED WINDOWS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Exterior windows fabricated from aluminum storefront framing designed to retain glazing mechanically with gaskets on four sides.
 - 2. Breakmetal accessories including trim and flashing integral with aluminum framing.
- B. Products Supplied But Not Installed Under This Section:
 - 1. Glazing gaskets are installed under Division 8 Section "Glazing."
- C. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 2. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following.
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
 - 5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units to function properly.

- B. Structural Loads:
1. Wind Loads: As indicated on Structural Drawings.
 2. Seismic Loads: As indicated on Structural Drawings.
- C. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch and clearance between members and operable units directly below to less than 1/16 inch.
- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- E. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..
- G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 58 when tested according to AAMA 1503.
- I. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.61 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

1.04 SUBMITTALS

- A. **Product Data:** Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. **Shop Drawings:** For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
- C. **Samples for Verification:** For each type of exposed finish required, in manufacturer's standard sizes.
- D. **Qualification Data:** For Installer.
- E. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.
- F. **Field quality-control test and inspection reports.**
- G. **Maintenance Data:** For aluminum-framed systems to include in maintenance manuals.
- H. **Warranties:** Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

- A. **Installer Qualifications:** Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
 - 1. **Engineering Responsibility:** Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B. **Product Options:** Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C. **Accessible Entrances:** In addition to requirements of authorities having jurisdiction, provide entrances that comply with the more restrictive requirements of both "California Disabled Accessibility Guidebook 2000" (CalDAG 2000) and the Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's

"Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water leakage through fixed glazing and framing areas.
 - e. Failure of operating components to function properly.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product: The design for aluminum-framed systems is based on Arcadia, Inc.; the following units:
 - 1. Exterior Window Units: TC470 Series, 2 1/4" X 4 1/2" Captured Vertical Offset Glazed System Thermally Broken For 1" Glass.
- B. Subject to compliance with requirements, provide the basis-of-design product or a comparable product by one of the following:
 - 1. EFCO Corporation.
 - 2. Kawneer.

3. Tubelite Inc.
4. United States Aluminum.
5. Vistawall Architectural Products.

2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308/B 308M.
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.03 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by

manufacturer for joint type.

2.04 GLAZING SYSTEMS

- A. Glazing: As specified in Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

2.05 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."
- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.06 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
- D. Window Framing: Fabricate components for assembly using either shear-block system or screw-spline system.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.07 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

- C. Clear Anodic Finish: Class I, AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:

- 1. Comply with manufacturer's written instructions.
- 2. Do not install damaged components.
- 3. Fit joints to produce hairline joints free of burrs and distortion.
- 4. Rigidly secure nonmovement joints.
- 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
- 6. Seal joints watertight, unless otherwise indicated.

- B. Metal Protection:

- 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
- 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

- D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

- F. Install glazing as specified in Division 8 Section "Glazing."

- G. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

- H. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

- 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.

2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 1. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08411

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Thresholds, gasketing and weather-stripping.
 - 4. Door silencers or mutes.
- C. Related Sections include the following:
 - 1. Division 8 Sections "Standard Steel Doors and Frames" and "Custom Steel Doors And Frames."
 - 2. Division 8 Section "Fiberglass Reinforced Door And Door Frame Systems."
 - 3. Division 13 Section "Access Control And alarm Monitoring System."

1.03 REFERENCES

- A. General: Use date of standard in effect as of Bid date.
- B. ADAAG - Americans with Disabilities Act (ACT) Accessibility Guidelines for Buildings and Facilities.
- C. BHMA - Builders' Hardware Manufacturers Association.
- D. CCR - California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- E. DHI - Door and Hardware Institute.
- F. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Windows
 - 2. NFPA 101 - Life Safety Code
 - 3. NFPA 105 - Smoke and Draft Control Door Assemblies

- G. Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- H. WHI - Warnock Hersey Incorporated
- I. SDI - Steel Door Institute

1.04 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Type, style, function, size and finish of each hardware item.
 - 2. Name, part number and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of hardware set coordinated with floor plans and door schedule.
 - 5. Explanation of all abbreviations, symbols and codes contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Door and frame sizes and materials.
 - 8. List of manufacturers used and their nearest representative with address and phone number.
 - 9. Keying information.
- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.
- F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.

1.05 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Responsible for detailing, scheduling and ordering of finish hardware.
 - 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3. Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
 - 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

1.07 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final

acceptance as follows:

1. Closers: 10 years, except electronic closers shall be 2 years.
2. Exit devices: 3 years.
3. All other hardware: 2 years.

1.08 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Hinges: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
 1. Hager.
 2. Stanley.
 3. McKinney
- B. Locks, Latches and Cylinders: Products: Subject to compliance with the requirements provide products by Schlage "L" Series as indicated in Part 3 hardware groups schedule with "17" Style Lever and "A" Style Rose.
- C. Exit Devices: Products: Subject to compliance with the requirements provide products by Von Duprin as indicated in Part 3 hardware groups schedule.
- D. Closers: Products: Subject to compliance with the requirements provide products by LCN as indicated in Part 3 hardware groups schedule.
- E. Push, Pulls and Protection Plates: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
 1. Trimco.
 2. BBW.
 3. Quality.

- F. Flush Bolts: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
1. Trimco.
 2. BBW.
 3. Quality.
- G. Dust Proof Strikes: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
1. Trimco.
 2. BBW.
 3. Quality.
- H. Coordinators: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
1. Trimco.
 2. BBW.
 3. Quality.
- I. Stops: Basis of Design Manufacturer: Subject to compliance with the requirements provide Ives or comparable product by one of the following manufacturers:
1. Trimco.
 2. BBW.
 3. Quality.
- J. Overhead Stops: Products: Subject to compliance with the requirements provide products by Glynn-Johnson as indicated in Part 3 hardware groups schedule.
- K. Thresholds: Basis of Design Manufacturer: Subject to compliance with the requirements provide Pemko or comparable product by one of the following manufacturers:
1. National Guard.
 2. Zero.
- L. Seals & Bottoms: Basis of Design Manufacturer: Subject to compliance with the requirements provide Pemko or comparable product by one of the following manufacturers:
1. National Guard.
 2. Zero.

2.02 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
1. Hinges shall be sized in accordance with the following:

- a. Height:
 - 1) Doors up to 41 inches wide: 4-1/2 inches.
 - 2) Doors 42 inches to 48 inches wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
2. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
- a. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Extra Heavy duty Commercial Mortise Locks:
- 1. Lock chassis shall be constructed of cold rolled steel.
 - 2. Latchbolt shall be 3/4 inch throw stainless steel with a stainless steel anti-friction tongue.
 - 3. The deadbolt, when used, shall be 1 inch throw stainless steel.
 - 4. All trim shall be through-bolted with the spring cages supporting the trim attached to the lock cases to prevent torquing.
 - 5. Cast lever trim and wrought rose trim.
 - 6. No set screws in outside lever are permitted, use threaded bushings only.
 - 7. Hand of lock chassis to be changeable by simply moving one screw from one side to the case to the other and pulling and reversing the latchbolt.
- C. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4 inch steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3 inch long screws. ANSI A156.5, 1992 Grade 1 certified.
- D. Exit devices:
- 1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 1994 standards.
 - 2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
 - 3. Mechanism case shall have an average thickness of 0.140 inch.
 - 4. Compression spring engineering.
 - 5. Non-handed basic device design with center case interchangeable with all functions.
 - 6. All devices shall have quiet return fluid dampeners.
 - 7. All latchbolts shall be deadlocking with 3/4 inch throw and have a self-lubricating coating to reduce friction and wear.
 - 8. Device push bar must release when a force of 32 pounds, or less, of pressure is applied when a force of 250 pounds is applied to the door.
 - 9. Device shall bear UL label for fire and or panic as may be required.
 - 10. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
 - 11. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of 0.130 inch thickness, match lockset lever design.
 - 12. Furnish glass bead kits for vision lites where required.
 - 13. All Exit Devices to be sex-bolted to the doors.

14. Panic Hardware shall comply with UBC Standard 10-4 and shall be mounted between 30 inches and 44 inches above the finished floor surface. The unlatching force shall not exceed 15 lbs. applied in the direction of travel. Panic hardware shall comply with CBC Section 1003.3.1.9.

E. Closers:

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16 inch steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
4. Closers shall be installed to permit doors to swing 180 degrees.
5. All closers shall utilize a stable fluid withstanding temperature range of 120 deg F to minus 30 deg F without requiring seasonal adjustment of closer speed to properly close the door.
6. Drop brackets are required at narrow head rails.
7. Maximum effort to operated doors shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the door may be increased but shall not to exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. Door shall take at least 3 seconds to move from an open position of 70 degrees to a point of 3 inches from the latch jamb. Reference CBC Sections 1133B.2.1, 1133B.2.5, 1133B2.5.1 & 1003.3.1.8.
8. Provide sex-bolted or through bolt mounting for all door closers.

F. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.

1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
2. Provide dust proof strikes at openings using bottom bolts.

G. Door Stops:

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Do not install floor stops more than 4 inches from the face of the wall or partition (Title 24, 1133B.8.6).
3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only

functions.

- H. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10 inches high and 2 inches LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine screws of bronze or stainless to match other hardware.
- I. Thresholds: As Scheduled and per details.
 - 1. Thresholds shall not exceed 1/2 inch in height, with a beveled surface of 1:2 maximum slope.
 - 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 Section "Joint Sealants."
 - 3. Use 1/4 inch fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 - 4. Thresholds shall comply with CBC Section 1133B.2.4.1.
- J. Seals: Provide silicone gasket at all rated and exterior doors.
- K. Door Top Caps: Provide door top caps at all exterior out-swing doors.
- L. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

- A. Furnish a Grand Master, Master, keyed alike or keyed different system as directed by the Owner or Architect.
- B. Provide construction keying for doors requiring locking during construction; remove temporary cores or inserts immediately prior to Owner occupancy. Furnish permanent keys (and cores if applicable) directly to Owner.
- C. Key Blanks: Standard "6" pin bow key blank; tag to identify.
- D. Supply keys and blanks as follows:
 - 1. Supply 2 cut change keys for each different change key code.
 - 2. Supply 1 uncut key blank for each change key code.
 - 3. Supply 6 cut master keys for each different master key set.
 - 4. Supply 3 uncut key blanks for each master key set.

2.04 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless other wise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 30 inches and 44 inches AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.
- H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and

reinstallation of hardware.

- I. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2, and ADAAG for positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturer's instructions and as specified herein.

3.06 HARDWARE GROUPS SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. The Door Schedule on the Drawings indicates which hardware set is used with each door.

C. Manufacturers Abbreviations:

1. ADA: Adams Rite; Storefront Door Hardware.
2. FAL: Falcon; Mortise Thumb Turn.
3. GLY: Glynn-Johnson Corporation; Overhead Door Stops.
4. IVE: Ives; Hinges, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Kick Plates, Door Stops & Silencers.
5. LCN: LCN; Door Closers.
6. NGP: National Guard Products; Thresholds, Gasketing & Weather-stripping.
7. SCH: Schlage Lock Company; Locks, Latches & Cylinders.
8. TRI: Trimco; Restroom Signs & Coat Hooks.
9. VON: Von Duprin; Exit Devices & Power Supplies.

HARDWARE GROUP: 01 (Not Used)

HARDWARE GROUP: 02 (Not Used)

HARDWARE GROUP: 03 (Not Used)

HARDWARE GROUP: 04 (Not Used)

HARDWARE GROUP: 05 (Not Used)

HARDWARE GROUP: 06 (Not Used)

HARDWARE GROUP: 07 (Not Used)

HARDWARE GROUP: 08 (Not Used)

HARDWARE GROUP: 09 (Not Used)

HARDWARE GROUP: 10

3	Ea	Hinge	5BB1HW 4.5 X 4.5	652	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Floor Stop	FS436	626	IVE
1	Set	Seals	5050B	BRN	NGP

HARDWARE GROUP: 10A (Not Used)

HARDWARE GROUP: 11 (Not Used)

HARDWARE GROUP: 11A (Not Used)

HARDWARE GROUP: 12 (Not Used)

HARDWARE GROUP: 13 (Not Used)

HARDWARE GROUP: 13A (Not Used)

HARDWARE GROUP: 14

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Privacy Set	L9040 17A L583-363	630	SCH
1	Ea	Surface Closer	4041 DEL	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Wall Stop	WS407CVX	630	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	ADA Sign	527/8/9	BLU	TRI
1	Ea	Restroom Sign	752/3/4	BLU	TRI
1	Ea	Coat Hook	3071	626	TRI

HARDWARE GROUP: 15 (Not Used)

HARDWARE GROUP: 16 (Not Used)

HARDWARE GROUP: 17 (Not Used)

HARDWARE GROUP: 17A (Not Used)

HARDWARE GROUP: 18 (Not Used)

HARDWARE GROUP: 19

3	Ea	Hinge	5BB1 4.5 X 4.5	630	IVE
1	Ea	Push Plate	8200 6" X 16"	630	IVE
1	Ea	Pull Plate	8302-8 4" X 16"	630	IVE
1	Ea	Surface Closer	4041 DEL	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
3	Ea	Silencer	SR64	GRY	IVE
1	Ea	ADA Sign	527/8	BLU	TRI
1	Ea	Restroom Sign	753/4	BLU	TRI

HARDWARE GROUP: 20 (Not Used)

HARDWARE GROUP: 21

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Corridor Lock	L9456P 17A L583-363	630	SCH
1	Ea	Surface Closer	4041	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Wall Stop	WS407CVX	630	IVE
1	Set	Seals	9440B	BRN	NGP

HARDWARE GROUP: 22 (Not Used)**HARDWARE GROUP: 23**

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Corridor Lock	L9456P 17A L583-363	630	SCH
1	Ea	Floor Stop	FS436	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 24

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Passage Set	L9010 17A	630	SCH
1	Ea	Floor Stop	FS436	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 25

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Floor Stop	FS436	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 26 (Not Used)**HARDWARE GROUP: 27 (Not Used)****HARDWARE GROUP: 28 (Not Used)**

HARDWARE GROUP: 29

1	Ea	Cylinder Or Padlock	VERIFY TYPE WITH DOOR MFR BALANCE OF HARDWARE BY DOOR MANUFACTURER	626	SCH
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HARDWARE GROUP: 30 (Not Used)

HARDWARE GROUP: 31 (Not Used)

HARDWARE GROUP: 32 (Not Used)

HARDWARE GROUP: 33 (Not Used)

HARDWARE GROUP: 34 (Not Used)

HARDWARE GROUP: 35 (Not Used)

HARDWARE GROUP: 36

6	Ea	Hinge	5BB1HW 4.5 X 4.5	652	IVE
1	Set	Const Latching Bolt	FB61P	630	IVE
1	Ea	Dust Proof Strike	DP2	626	IVE
1	Ea	Fire Exit Hardware	9875L-F X 996L-17	626	VON
1	Ea	Mortise Cylinder	20-001 1-1/4"	626	SCH
1	Ea	Coordinator	COR X FL (UNEQUAL LEAFS)	628	IVE
1	Ea	Astragal	158SA	AL	NGP
1	Ea	Surface Closer	4030 (1/6 LEAF SPECIAL TEMPLATE)	689	LCN
1	Ea	Surface Closer	4041 (3/6 WIDE LEAF)	689	LCN
2	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
2	Ea	Magnetic Hold-Open	SEM 7850 24V	AL	LCN
1	Set	Seals	9440B	BRN	NGP

Contacts By Elec. / Security Contractor

HARDWARE GROUP: 37 (Not Used)

HARDWARE GROUP: 38

3	Ea	Hinge	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Lock Guard	LG1	600	IVE
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Floor Stop & Holder	FS43	626	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	Door Sweep	200NA	AL	NGP
1	Ea	Threshold	Per Detail	AL	NGP

HARDWARE GROUP: 39

3	Ea	Hinge	5BB1 4.5 X 4.5	630	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Surface Closer	4041	689	LCN
1	Ea	Floor Stop	FS442	626	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	Door Bottom	35VA	AL	NGP
1	Ea	Threshold	Per Detail	AL	NGP

HARDWARE GROUP: 40

3	Ea	Hinge	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Lock Guard	LG1	600	IVE
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Floor Stop & Holder	FS43	626	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	Door Sweep	200NA	AL	NGP
1	Ea	Threshold	Per Detail	AL	NGP

HARDWARE GROUP: 41

6	Ea	Hinge	5BB1 4.5 X 4.5 NRP	630	IVE
2	Ea	Manual Flush Bolt	FB458	626	IVE
1	Ea	Dust Proof Strike	DP1	626	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Astragal	139SP (OR BY HM DOOR MFR)	600	NGP
2	Ea	Overhead Holder	700H	626	GLY
1	Set	Seals	5050B	BRN	NGP
2	Ea	Door Sweep	200NA	AL	NGP
1	Ea	Threshold	Per Detail	AL	NGP

HARDWARE GROUP: 42

3	Ea	Hinge	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	Ea	Panic Hardware	98NL-OP	626	VON
1	Ea	Rim Cylinder	20-022	626	SCH
1	Ea	Door Pull	VR910NL	630	IVE
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Floor Stop	FS442	626	IVE
1	Set	Seals	5050B	BRN	NGP
1	Ea	Door Bottom	35VA	AL	NGP
1	Ea	Threshold	Per Detail	AL	NGP

HARDWARE GROUP: 43

6	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
2	Ea	Manual Flush Bolt	FB458	626	IVE
1	Ea	Dust Proof Strike	DP2	626	IVE
1	Ea	Corridor Lock	L9456P 17A L583-363	630	SCH
1	Ea	Astragal	139SP (OR BY HM DOOR MFR)	600	NGP
2	Ea	Floor Stop	FS441	626	IVE
2	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 44

3	Ea	Hinge	5BB1 4.5 X 4.5	630	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Floor Stop	FS441	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 45

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Surface Closer	4041	689	LCN
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 46

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Surface Closer	4041	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Wall Stop	WS407CVX	630	IVE
1	Set	Seals	9440B	BRN	NGP

HARDWARE GROUP: 47

1	Ea	Cylinder Or Padlock	VERIFY TYPE WITH DOOR MFR BALANCE OF HARDWARE BY DOOR MANUFACTURER	626	SCH
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HARDWARE GROUP: 48

6	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
2	Ea	Manual Flush Bolt	FB358 (UL)	626	IVE
1	Ea	Dust Proof Strike	D P2	626	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Astragal	158SA	AL	NGP
2	Ea	Overhead Stop	450S	630	GLY
2	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 49

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Surface Closer	4041	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Floor Stop & Holder	FS40	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 50

3	Ea	Hinge	5BB1 4.5 X 4.5	652	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Surface Closer	4041	689	LCN
1	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
1	Ea	Floor Stop & Holder	FS40	626	IVE
3	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 51

6	Ea	Hinge	5BB1HW 4.5 X 4.5	652	IVE
1	Ea	Auto Flush Bolt	FB31T	630	IVE
1	Ea	Vestibule Lock	L9060P 17A	630	SCH
1	Ea	Coordinator	COR X FL	628	IVE
1	Ea	Astragal	139SP (OR BY HM DOOR MFR)	600	NGP
2	Ea	Surface Closer	1461 FC	689	LCN
2	Ea	Kick Plate	8400 10" X 2" LDW	630	IVE
2	Ea	Floor Stop & Holder	FS40	626	IVE
2	Ea	Silencer	SR64	GRY	IVE

HARDWARE GROUP: 52

3	Ea	Hinge	5BB1 4.5 X 4.5 NRP	652	IVE
1	Ea	Storeroom Lock	L9080P 17A	630	SCH
1	Ea	Surface Closer	4041 EDA	689	LCN
1	Ea	Floor Stop	FS436	626	IVE
1	Set	Seals	9440B	BRN	NGP

END OF SECTION 08710

SECTION 08800

GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows using storefront framing.
 - 2. Doors.
 - 3. Glazed entrances.
 - 4. Interior borrowed lites.
- B. Products Installed But Not Supplied Under This Section:
 - 1. Glazing gaskets specified in Division 8 Sections "Aluminum-Framed Windows."

1.03 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and

installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: 20 psf inward and outward..
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.

- B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
 - 1. Each color of tinted float glass.
 - 2. Coated vision glass.
 - 3. Insulating glass for each designation indicated.

- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
 - 1. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 - 2. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

- D. Qualification Data: For installers.

- E. Product Test Reports: For each of the following types of glazing products:
 - 1. Tinted float glass.
 - 2. Coated float glass.
 - 3. Insulating glass.
 - 4. Glazing sealants.
 - 5. Glazing gaskets.

- F. Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

- B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass and insulating glass.

- C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

- D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

- E. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- F. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of manufacturer acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in area, provide glazing products that comply with Category II materials, and for lites 9 sq. ft. or less in area, provide glazing products that comply with Category I or II materials.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.
- I. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.09 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 - 2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 3. For uncoated glass, comply with requirements for Condition A.
 - 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 - 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
- D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.

3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Manufacturer's standard sealants.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Desiccant: Molecular sieve or silica gel, or blend of both.
 - c. Corner Construction: Manufacturer's standard corner construction.

2.02 FIRE-RATED GLAZING PRODUCTS

- A. Film-Faced Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of a 3/16-inch- thick, ceramic glazing material polished on both surfaces, faced on one surface with a clear glazing film, and as follows:
 1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Product: "FireLite NT" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
- B. Laminated Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft.; and as follows:
 1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Polished on both surfaces, transparent.
 3. Product: "FireLite Plus" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

2.03 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Neutral-Curing Silicone Glazing Sealants:
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Dow Corning Corporation; 791 and 795.
 - 2) GE Silicones; SilPruf NB SCS9000 and UltraPruf II SCS2900.
 - 3) Pecora Corporation; 865, 895 and 898.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 50.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
 - f. Applications include the following: Heal beads, cap beads and bedding.
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.04 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.05 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.06 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

2.07 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units: Class 1 (clear) annealed, Kind HS (heat-strengthened) float glass and Kind FT (fully tempered) float glass.
 - 1. Thickness: 6.0 mm.

2.08 INSULATING-GLASS UNITS

- A. Solar-Control Low-E Insulating-Glass Units:
 - 1. Basis-of-Design Product: Subject to compliance with the requirements provide PPG Architectural Glass; Solarban 60(3) "Azuria" Low-E Tinted Insulating Glass or a comparable product by one of the following:
 - a. Interpane.
 - b. Oldcastle Glass, Inc.
 - c. Viracon.
 - 2. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
 - 3. Interspace Content: Air.
 - 4. Outdoor Lite: "Azuria" by PPG Industries.
 - a. Annealed, Kind HS (heat strengthened) and Kind FT (fully tempered).
 - 5. Indoor Lite: Class 1 (clear) float glass.
 - a. Annealed, Kind HS (heat strengthened) and Kind FT (fully tempered).

6. Low-E Coating: Sputtered on third surface.
7. Performance Values: Following values are based on Basis of Design Product. Performance of comparable products shall vary by no more than 5 percent of the following:
 - a. Visible Light Transmittance: 52 percent.
 - b. Winter Nighttime U-Factor: 0.29.
 - c. Summer Daytime U-Factor: 0.31.
 - d. Solar Heat Gain Coefficient: 0.30.
 - e. Outdoor Visible Reflectance: 9 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Presence and functioning of weep system.
 3. Minimum required face or edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Where framing is prefinished, apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely

in place with joints miter cut and bonded together at corners.

- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.06 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 08840
PLASTIC GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes multiwalled structured polycarbonate glazing.
- B. Related Section includes Division 8 Section "Polycarbonate Glazed Wall Assemblies" for aluminum framing system receiving plastic glazing.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide plastic glazing sheets and glazing materials capable of withstanding normal temperature changes, wind and impact loads without failure, including loss or breakage of plastic sheets attributable to the following: failure of sealants or gaskets to remain watertight and airtight, deterioration of plastic sheet and glazing materials, or other defects in materials and installation.

1.04 SUBMITTALS

- A. Product Data: For each type of plastic glazing sheet and glazing material indicated.
- B. Shop Drawings: For each type of plastic glazing installation indicated. Show details of fabrication and installation.
- C. Samples for Initial Selection: For each type of plastic glazing sheet and glazing gasket indicated.
- D. Samples for Verification: For each color and finish of plastic glazing sheet indicated, prepared on samples 12 inches square and of same thickness and material indicated for final Work.
 - 1. Install sample along with plastic glazing sheet sample between two strips of material representative of adjoining framing system in color.
- E. Glazing Schedule: For glazed openings; use same designations indicated on Drawings.
- F. Material Certificates: For plastic glazing, signed by manufacturers.
- G. Research/Evaluation Reports: For plastic glazing sheets.
- H. Maintenance Data: For plastic glazing sheet materials to include in maintenance manuals.
- I. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic glazing materials through one source from a single manufacturer for each type of plastic glazing sheet and glazing material indicated.
- B. Glazing Publication: Comply with published recommendations in GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glazing terms not otherwise defined in this Section or other referenced standards.
- C. Fire-Test-Response Characteristics: Provide plastic glazing sheets identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify plastic glazing sheets with appropriate markings of applicable testing and inspecting agency.
 - 1. Self-Ignition Temperature: 650 deg F or more when tested per ASTM D 1929 on plastic glazing sheets in thicknesses indicated for Work.
 - 2. Smoke density of 75 or less when tested per ASTM D 2843 on plastic glazing sheets in thicknesses indicated for Work.
 - 3. Relative Burning Characteristics: As follows, when tested per ASTM D 635:
 - a. Burning rate of 2.5 in./min. or less when tested on plastic glazing indicated below with a nominal thickness of 0.060 inch or thickness indicated for Work.
- D. Safety Glazing: Where safety glazing is indicated, provide products complying with testing requirements in 16 CFR 1201 for Category II materials and in ANSI Z97.1.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Install plastic glazing as part of mockups specified in the following Section:
 - a. Division 8 Section "Aluminum-Framed Entrances and Storefronts."
 - b. Division 8 Section "Aluminum Windows."
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's written instructions for shipping, storing, and handling plastic glazing sheets and for removing protective coverings after installation.
- B. Maintain protective coverings on sheets to avoid exposures to abrasive substances, excessive heat, and other sources of possible deterioration.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installing glazing sealants when

ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturers or below 40 deg F .

1.08 WARRANTY

A. Manufacturer's Special Warranty for Abrasion- and UV-Resistant, Multiwalled, Structured Polycarbonate Sheet: Manufacturer's standard form, made out to Owner and signed by polycarbonate manufacturer, in which manufacturer agrees to replace polycarbonate sheet that breaks or develops defects from normal use that are attributable to the manufacturing process and not to practices for maintaining and cleaning plastic glazing sheet contrary to manufacturer's written instructions. Defects include coating delamination, increases in haze, excessive yellowing, and losses in light transmission beyond the limits stated in plastic glazing sheet manufacturer's standard form.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLAZING PLASTICS, GENERAL

A. Sizes: Fabricate plastic glazing sheets to sizes required for glazing openings indicated. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with written instructions of plastic glazing manufacturer.

2.02 MULTIWALLED STRUCTURED POLYCARBONATE GLAZING

A. Multiwalled Structured Polycarbonate Sheet: Manufacturer's standard translucent extruded-polycarbonate sheet with internal ribbing and smooth, flat exterior surfaces:

1. Basis of Design Product: Subject to compliance with requirements, provide POLYGAL USA, Inc.; Polygal Solar Grade Standard for use with basis of design aluminum framing system specified in Division 8 Section "Polycarbonate Glazed Wall Assemblies" or comparable product by one of the following manufacturers:

- a. GE Structured Products; Lexan Thermoclear LTC .
- b. GE Structured Products; Lexan Thermoclear Plus LT2UVA .

2. Color: As selected by Architect from manufacturer's full range.

2.03 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets, EPDM, ASTM C 864; and of profile and hardness required to maintain watertight seal.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.

2.04 MISCELLANEOUS GLAZING MATERIALS

A. Compatibility: Provide materials with a proven record of compatibility with surfaces

contacted in installation.

- B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: EPDM or silicone as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.
- D. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5- to 10-psi compression strength for 25 percent deflection.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine plastic glazing framing, with glazing Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Minimum required face or edge clearances.
 - 3. Effective sealing between joints of plastic glazing framing members.
 - 4. Proceed with glazing only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members to receive plastic glazing immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publication.
- B. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.
- C. Remove burrs and other projections from glazing channel surfaces.
- D. Protect plastic glazing surfaces from abrasion and other damage during handling and installation, according to the following requirements:
 - 1. Retain plastic glazing manufacturer's protective covering or protect by other methods according to plastic glazing manufacturer's written instructions.
 - 2. Remove covering at border of each piece before glazing; remove remainder of covering immediately after installation where plastic glazing will be exposed to sunlight or where other conditions make later removal difficult.
 - 3. Remove damaged plastic glazing sheets from Project site and legally dispose of

off-site. Damaged plastic glazing sheets are those containing imperfections that, when installed, result in weakened glazing and impaired performance and appearance.

- E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- F. Install elastomeric setting blocks in sill channels, sized and located to comply with referenced glazing publication, unless otherwise instructed by plastic glazing manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- G. Provide edge blocking to comply with referenced glazing publication, unless otherwise instructed by plastic glazing manufacturer.

3.04 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended in writing by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between plastic glazing and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center plastic glazing lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in plastic glazing. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.05 PROTECTING AND CLEANING

- A. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash by method recommended in writing by plastic glazing manufacturer.
- B. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.
- C. Wash plastic glazing on both faces before date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Wash plastic glazing by method recommended in writing by plastic glazing manufacturer.

END OF SECTION 08840

SECTION 08950

POLYCARBONATE GLAZED WALL ASSEMBLIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes aluminum-framed wall assemblies incorporating translucent, polycarbonate glazing products.
- B. Related Section includes Division 8 Section "Plastic Glazing" for polycarbonate glazing products.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide translucent wall assemblies capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
 - 1. Supporting-frame deflection exceeding specified limits.
 - 2. Sandwich-panel deflection exceeding manufacturer's recommended limits or causing panel failure.
 - 3. Thermal stresses transferred to the building structure.
 - 4. Noise or vibration created by thermal and structural movement and wind.
 - 5. Loosening or weakening of fasteners, attachments, and other components.
 - 6. Sealant failure.
- B. Supporting-Frame-Member Deflection Limits: As follows:
 - 1. Deflection of the entire length of framing members in direction normal to translucent wall assembly plane is limited to 1/100 of clear span.
- C. Structural Loads: Provide translucent wall assemblies, including anchorage, capable of withstanding the effects of the following design loads when supporting full dead loads:
 - 1. Wind Loads: As indicated on Structural Drawings.
- D. Thermal Movement: Provide translucent wall assemblies that allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, sealant failure, and other detrimental effects.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. Air Infiltration: Provide translucent wall assemblies with maximum air leakage of 0.07 cfm/sq. ft. of surface when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 pounds force per square foot.

- F. Water Penetration: Provide translucent wall assemblies that do not evidence water penetration when tested according to ASTM E 331 at a minimum static pressure differential of 20 percent of positive design wind load, but not less than 30 pounds force per square foot.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions, profiles, and finishes of translucent wall components.
- B. Shop Drawings: For translucent wall assemblies, include plans, elevations, sections, details, and attachments to other Work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of sections of units showing the full range of colors available for the following:
 - 1. Factory-finished aluminum.
- D. Samples for Verification: For each exposed finish required, in same thickness and material indicated for the Work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
 - 1. Factory-Finished Aluminum: 12-inch- long sections.
- E. Cutaway Sample: Of framing intersection, made from 12-inch- long lengths of full-size components and showing details of the following:
 - 1. Primary framing members.
 - 2. Joinery.
 - 3. Expansion provisions.
- F. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
- G. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of aluminum-framed systems.
 - 2. Include design calculations.
- H. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- I. Product Test Reports: From a qualified testing agency indicating translucent wall assemblies comply with requirements, based on comprehensive testing of current

products.

J. Warranties: Sample of special warranties.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing translucent wall assemblies similar to those indicated for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Preparation of data for translucent wall assemblies, including Shop Drawings, based on engineering analysis of manufacturer's standard translucent wall assemblies similar to those indicated for this Project.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of translucent wall assemblies and are based on Kalwall translucent wall panel system. Other manufacturers' skylight systems that comply with requirements may be considered. Refer to Division 1 Section "Substitutions."
 - 1. Do not modify intended aesthetic effects, as judged solely by Contracting Officer, except with Contracting Officer's approval. If modifications are proposed, submit comprehensive explanatory data to Contracting Officer for review.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where translucent wall assemblies are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating translucent wall assemblies without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of translucent wall assemblies that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures.
 - 2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 3. Water leakage, defined as uncontrolled water appearing on normally exposed interior surfaces of translucent wall assemblies from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water

- leakage.
4. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide Duo-Gard Industries Inc.; Series 3000 Base Plate, Pressure Plat and Cap System glazed with basis of design multiwalled structured polycarbonate sheet specified in Division 8 Section "Plastic Glazing" or comparable product by one of the following:
 1. Major Industries, Inc.
 2. Naturalite Skylight Systems.
 3. Skywall Translucent Systems.

2.02 MATERIALS AND PRODUCTS

- A. Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, and as follows:
 1. Extrusions: ASTM B 221.
 2. Sheet and Plate: ASTM B 209.
 3. Bars, Rods, and Wire: ASTM B 211.
- B. Battens, Brackets, and Reinforcements: Manufacturer's standard high-strength aluminum units.
- C. Exposed Flashing and Closures: Aluminum sheet, minimum 0.060 inch thick.
- D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories; compatible with adjacent materials.
 1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
 2. Aluminum-Retaining-Cap or Batten Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
 3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
 4. Anchor Bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
 5. Shims: Nonstaining, nonferrous shims compatible with adjacent materials, for installing and aligning skylight.
- E. Wall-System Gaskets and Joint Fillers: Manufacturer's standard permanent gaskets and joint fillers for sliding, compression, and nonmoving joints.
- F. Wall-System Sealants: Compatible with components with which sealants come in contact and recommended by skylight and sealant manufacturers for this use.
- G. Bituminous Paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.

2.03 FABRICATION

A. Aluminum Components: As follows:

1. Fabricate components that, when assembled, will have accurately fitted joints with ends coped, mitered, or butted to produce hairline joints free of burrs and distortion.
2. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within wall system to the exterior.
3. Fabricate components to accommodate expansion, contraction, and field adjustment and to provide for minimum clearance and shimming at wall system perimeter.
4. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
5. Fit and assemble components to greatest extent practicable before finishing.
6. Reinforce members as required to retain fastener threads.
7. Where fasteners are exposed to view from interior, countersink fastener heads and finish them to match framing.
8. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Fabricate flashing with weatherproof expansion joints and corners.

C. Prepare framing to receive anchor and connection devices and fasteners.

2.04 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Metal Protection: As follows:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

3.03 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing skylight components.
 - 1. Fit aluminum component joints to produce hairline joints free of burrs and distortion.
 - 2. Rigidly secure nonmovement joints.
 - 3. Accommodate thermal and mechanical movements.
 - 4. Install framing components to drain water passing joints and to drain condensation and moisture occurring or migrating within wall system to the exterior.
 - 5. Coordinate installation of insulation and flashings at skylight perimeters to maintain continuity of thermal and water barriers.
 - 6. Set continuous flashings in a full sealant bed, unless otherwise indicated. Comply with requirements in Division 7 Section "Joint Sealants."
- B. Erection Tolerances: Install wall system components true in plane, accurately aligned, and without warp or rack. Adjust to comply with the following tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet; 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.
- C. Install sealants according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner is entitled to engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.
- B. Water-Spray Test: Test translucent wall assemblies according to procedures in AAMA 501.2.
- C. Repair or replace Work that does not pass testing or that is damaged by testing; and retest Work.

3.05 CLEANING

- A. Clean translucent wall assemblies inside and outside, immediately after installation, according to manufacturer's written recommendations.
 - 1. Remove temporary protective coverings and strippable coatings from factory-finished metal surfaces. Remove labels and markings from all components.

END OF SECTION 08950

SECTION 09220

PORTLAND CEMENT PLASTER (STUCCO)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes exterior portland cement plasterwork (stucco) on metal lath and solid plaster bases with acrylic based integrally colored finish coating, and, the following:
 - 1. Metal lath and paper backing.
 - 2. Flexible flashing.
 - 3. Trim units.
 - 4. Building paper.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Sheet metal flashing and trim installed beneath stucco lath and accessories is specified in Division 7 Section "Sheet Metal Flashing And Trim."
- C. Related Sections include the following:
 - 1. Division 5 Section "Cold-Formed Metal Framing" for structural steel stud framing supporting portland cement plaster.
 - 2. Division 7 Section "Joint Sealants" for sealants installed with exterior portland cement plaster.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
 - 1. Distinguish between expansion joints accommodating movement in only one direction (expansion/contraction) and joints accommodating movement in two directions (expansion/contraction and vertical shear).
- C. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.
- D. Samples for Verification: For each type of factory-prepared, colored textured, finish coat indicated; 12 by 12 inches, and prepared on rigid backing.

1.04 QUALITY ASSURANCE

- A. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for each type of finish indicated.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.06 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - 2. Apply plaster when ambient temperature is greater than 40 deg F.
 - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.01 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alabama Metal Industries Corporation (AMICO).
 - b. California Expanded Metal Products Company (CEMCO).
 - c. Dale/Incor.
 - d. Unimast, Inc.
 - e. Western Metal Lath & Steel Framing Systems.

2. Lath:
 - a. Self-Furring Diamond-Mesh Lath: For sheathed vertical surfaces and curved soffit surfaces.
 - b. Weight:
 - 1) Vertical Applications: Not less than 2.5 lb/sq. yd.
 - 2) Horizontal Applications: Not less than 3.4 lb/sq. yd.

- B. Paper Backing: FS UU-B-790, Type I Grade D, Style 2 vapor-permeable paper.
 1. Provide paper-backed lath unless otherwise indicated.

- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.
 - c. MFM Building Products Corp.; Window Wrap.
 - d. Polyguard Products, Inc.; Polyguard 300.

- D. Building Paper: UBC Standard 14-1, Grade D (water-vapor-permeable, kraft building paper), except that water resistance shall be not less than 1 hour and water-vapor transmission shall be not less than 75 g/sq. m x 24 h.
 1. Available Product: Subject to compliance with the requirements provide Fortifiber; Super Jumbo Tex 60 Minute or comparable product by another manufacturer.

2.02 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

- B. Zinc and Zinc-Coated (Galvanized) Accessories:
 1. Basis of Design Products: Subject to compliance with requirements, Provide Alabama Metal Industries Corporation (AMICO); products indicated below or comparable products by one of the following manufacturers:
 - a. California Expanded Metal Products Company (CEMCO).
 - b. Dale/Incor.
 - c. Dietrich Industries, Inc.
 - d. Unimast, Inc.
 - e. Western Metal Lath & Steel Framing Systems.

2. Foundation Weep Screenshot: Fabricated from hot-dip galvanized steel sheet, ASTM A 653/A 653M, G60 zinc coating.
 - a. Basis of Design Product: AMICO; Foundation Weep Screenshot (No. 7).
3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - a. Basis of Design Product: AMICO; Smoothedge Cornalath.
4. External-Corner Reinforcement (Corners at Openings): Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - a. Basis of Design Product: AMICO; Smoothedge Striplath.
5. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
 - a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - 1) Basis of Design Product: AMICO; X-1 Corner Bead.
 - b. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.
 - 1) Basis of Design Product: AMICO; X-2 Corner Bead.
6. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
 - a. Basis of Design Product: AMICO; X-66 Casing Bead (Plaster Stop).
7. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - a. Basis of Design Products:
 - 1) Field Joints: AMICO; Expansion Control Joint (M or VV Type).
 - 2) Inside Joints: AMICO; Expansion/Control Joint.
8. Single Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - a. Basis of Design Product:
 - 1) Field Joints: AMICO; Griplock "J" Expansion/Control Joint (J Type).
 - 2) Inside Joints: AMICO; Expansion/Control Joint.

9. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4-to-5/8-inch wide; with perforated flanges.
 - a. Use two-piece expansion joints at vertical shear joints.
 - b. Vertical shear joints include locations where metal stud framing on one side of joints is supported at base track and where framing on other side of joint is supported by clip or top track.
 - c. Basis of Design Product: AMICO; 2-Piece Expansion Joint (Number 40 Type).

2.03 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
 1. Where metal lath is applied over plastic foam board trim base provide fasteners with sufficient length to penetrate all joined materials.
- F. Waterproof Adhesive for Polystyrene Board Material: Acrylic-based finish coating manufacturer's standard waterproof mixture complying with one of the following requirements for material composition and method of combining materials:
 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use indicated.
 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.

2.04 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
- B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- C. Sand Aggregate: ASTM C 897.
- D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
 1. Basis of Design: Subject to the requirements of this specification, provide stucco materials by La Habra Stucco, or a comparable product from one of the following

manufacturers:

- a. California Stucco Products Corp.; Conventional Portland Cement Stucco.
- b. ChemRex; Thoro Stucco.
- c. United States Gypsum Co.; Oriental Exterior Finish Stucco.

2. Color: As selected by Architect from manufacturer's full range

2.05 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. ft. of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

B. Base-Coat Mixes for Use over Metal Lath: Base coat for two-coat plasterwork as follows:

1. Portland Cement Mix Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).

C. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.03 INSTALLING BUILDING PAPER, METAL LATH AND FLASHING

A. Expanded-Metal Lath: Install according to ASTM C 1063. Apply 1 layer of building paper on sheathing surfaces prior to installing paper-backed lath as indicated below.

1. Flat-Ceiling, Soffit and Horizontal Surfaces: Install flat rib lath.

2. On Sheathed Vertical Surfaces: Install self-furring diamond-mesh lath.

B. Install metal flashing over sheathing and behind building paper by fastening through sheathing into framing.

- C. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 - 4. Lap weather-resistant building paper over flashing at heads of openings.
- D. Apply building paper to sheathing, horizontally with a 2-inch overlap and a 6-inch end lap; fasten through sheathing to metal studs with galvanized staples. Where installation of paper backed metal lath is deferred then fasten building paper with plastic capped sheet metal screws.
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.

3.04 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063, over plastic board trim base and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
 - 1. Install lath-type external-corner reinforcement at exterior locations.
- C. Control Joints: Install control joints at locations indicated on Drawings and as follows with prior approval of Architect:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft.
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
 - 2. At distances between control joints of not greater than 18 feet o.c.
 - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.
 - 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.05 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
 - 1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
 - 2. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full

grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor.

3. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

C. Plaster Finish Coats: Apply to provide skip trowel-textured finish.

3.06 CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.07 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from doorframes, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09220

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
1. Non-load-bearing steel framing.
 2. Flat strap and stud backing for toilet room accessories and other wall mounted components indicated.
 3. Interior gypsum wallboard.
 4. Tile backing panels.
 5. Joint treatment materials.
 6. Acoustical sealant.
 7. Sound attenuation blankets.
- B. Related Sections include the following:
1. Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing.
 2. Division 6 Section "Miscellaneous Carpentry" for wood furring.
 3. Division 7 Section "Building Insulation" for insulation and vapor retarders installed in gypsum board assemblies.

1.03 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.
- B. Steel gage numbers and corresponding minimum base metal (uncoated) thicknesses shall be as indicated in the table below.

STEEL SHEET THICKNESSES	
	Minimum Steel Base Metal (Uncoated) Thickness
Gauge	Inch
16	0.0538
20	0.0312
22	0.0270
25	0.0179

- C. Tie wire and hanger wire diameters (uncoated) and corresponding U.S. steel wire gauge shall be as indicated in the table below:

WIRE DIAMETER	
	Minimum Steel Base Metal (Uncoated) Diameter
Gauge	Inch
14	0.0800
13	0.0915
12	0.1055
11	0.1205
10	0.1350
9	0.1483
8	0.1620

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch- long length for each anodized aluminum trim accessory indicated.

1.05 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Steel Framing and Furring:
 - a. Clark Steel Framing Systems.
 - b. Consolidated Systems, Inc.
 - c. Dale Industries, Inc. - Dale/Incor.
 - d. Dietrich Industries, Inc.
 - e. MarinoWare; Division of Ware Ind.
 - f. National Gypsum Company.
 - g. Scafco Corporation.
 - h. Unimast, Inc.
 - i. Western Metal Lath & Steel Framing Systems.
 2. Gypsum Board and Related Products:
 - a. American Gypsum Co.
 - b. G-P Gypsum Corp.
 - c. National Gypsum Company.
 - d. United States Gypsum Co.

2.02 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Components, General: Comply with ASTM C 754 for conditions indicated.
- B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.
- C. Hanger Attachments to Concrete: Powder-actuated fasteners suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
- D. Hanger Attachments to Metal Decking Not Concrete Topped: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
1. Postinstalled Eye Lag Type Screws: Self-tapping screw fastener designed for use with metal framing. Each fastener shall be about 2 inches long overall and include an integral self-tapping threaded screw, washer, shank and flattened eyelet portion with hole sized to accept suspension wire. Manufacture from 1018 heat-treated steel with electroplated zinc Type II coating.
 - a. Screws shall comply with following allowable tension load for 20 gage (minimum uncoated thickness of 0.030 inch) metal decking with 38,000 psi

- minimum yield strength: 170 psi inclusive of 2-1/2 safety factor for steel decking.
- b. Use of this screw shall be limited to ceiling systems weighing no more than 2.5 psf.
2. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to the following:
 - a. I-LAG Brand Eye Lag Screws, 750 SD; Doc's Marketing Corp.
- E. Hangers: As follows:
1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162 inch diameter (8 gauge).
 2. Angle Compression Struts: ASTM A 653/A 653M, G60 hot-dip galvanized commercial-steel sheet.
 - a. Minimum Base Metal Thickness: 0.0312 inch (20 gauge).
 - b. Size: 1-5/8 by 1-5/8 inches.
- F. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch- wide flange, complying with the following:
1. Metallic Coating: Provide manufacturer's standard corrosion-resistant zinc coating.
 2. Depth: 1-1/2 inches.
- G. Furring Channels (Furring Members): Commercial-steel sheet complying with the following:
1. Coating: Provide manufacturer's standard corrosion-resistant zinc coating.
 2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base Metal Thickness: 0.0179 inch (25 gauge).
- H. Grid Suspension System for Interior Ceilings: ASTM C 645 or ASTM C 635, direct-hung system composed of main beams and cross-furring members that interlock.
1. Acceptable Locations: All locations.
 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Chicago Metallic Corporation; Drywall Furring 640 or Drywall Furring 660 System.
 - b. USG Interiors, Inc.; Drywall Suspension System.
- I. Seismic Struts (Strut Stabilizer): Manufacturer's standard compression struts designed to accommodate seismic forces.

2.03 STEEL PARTITION AND SOFFIT FRAMING

- A. Components, General: As follows:
1. Comply with ASTM C 754 for conditions indicated.

2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with the following metallic coatings:
 - a. Provide manufacturer's standard corrosion-resistant zinc coating.
- B. Steel Studs, Runners and Bracing: ASTM C 645.
 1. Minimum Base Metal Thickness: As indicated.
 2. Depth: As indicated.
- C. Deep-Leg Deflection Track: ASTM C 645 top runner with 3-inch- deep flanges.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. Minimum Base Metal Thickness: 0.0312 inch (16 gauge).
- E. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange.
 1. Depth: 1-1/2 inches.
 2. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 1. Minimum Base Metal Thickness: As indicated.
 2. Depth: As indicated.
- G. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
- H. Z-Shaped Furring and Clips: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- I. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.04 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard: ASTM C 36, Type X:
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
 3. Location: Vertical and horizontal surfaces, unless otherwise indicated.

2.05 TILE BACKING PANELS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

- B. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M; 5/8 inch, Type X core.

2.06 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.

- 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
- 2. Shapes:
 - a. Cornerbead: Use at outside corners.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.
 - c. Expansion (Control) Joint: Use where indicated.
 - d. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.

- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
- 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
- 3. Clear Anodic Finish: Class I, AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Match finish of window specified in Division 8 Section "Aluminum Windows."

2.07 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.

- B. Joint Tape:

- 1. Interior Gypsum Wallboard: Paper.
- 2. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

- 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.

2.08 ACOUSTICAL SEALANT

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

- a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
- b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2. Acoustical Sealant for Concealed Joints:

- a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
- b. Pecora Corp.; BA-98.
- c. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.09 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 (20 gauge) to 0.112 inch thick.

D. Isolation Strip at Exterior Walls: Either of following at Contractor's option:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt),

- nonperforated.
- 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- F. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.03 INSTALLING STEEL FRAMING, GENERAL

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
 - 1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
 - 2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
 - a. Use deep-leg deflection track where indicated.

- D. Do not bridge building control joints with steel framing or furring members. Frame both sides of joints independently.

3.04 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Do not attach hangers to steel deck tabs.
5. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - a. Where attachment to steel roof deck is unavoidable, use postinstalled eye lag type screws fastened only through bottom flute of deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
7. Install seismic struts (strut stabilizer) at all perimeter edges of framing.

- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.

- C. Sway-brace suspended steel framing with hangers used for support.

1. Brace vertical hangers with angle compression struts where hanger sway bracing connects to suspension framing

- D. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

- E. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

- F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.05 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.
 - 1. Where studs are installed directly against exterior walls, install asphalt-felt or foam-gasket isolation strip between studs and wall.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 - 1. Cut studs 1/2 inch short of full height to provide perimeter relief. Do not fasten studs to top track to allow independent movement of studs and track.
 - 2. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.
 - a. Terminate partition framing at suspended ceilings where indicated. Brace partition wall to structure above with stud framing staggered at 4 foot o.c. maximum.
- D. Install steel studs and furring at the following spacings:
 - 1. Single-Layer Construction: 16 inches o.c., unless otherwise indicated on Drawings.
 - 2. Multilayer Construction: 16 inches o.c., unless otherwise indicated on Drawings.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - 1. Install two 16 gauge studs at each jamb. Weld studs with 1 inch long intermittent welds at all hinge locations and spacing not exceeding 18 inches o.c.
 - 2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
 - 3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
 - 4. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.06 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- K. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
 - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.07 PANEL APPLICATION METHODS

A. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.

B. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

C. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

D. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.

E. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

F. Tile Backing Panels:

- 1. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at showers and locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- 2. Cementitious Backer Units: ANSI A108.11, at showers and locations indicated to receive tile.

3.08 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings.
- C. Aluminum Trim: Install in locations indicated on Drawings.

3.09 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.
 - 3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

3.10 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
 - 1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
 - 2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
 - a. Installation of 80 percent of lighting fixtures, powered for operation.
 - b. Installation, insulation, and leak and pressure testing of water piping systems.
 - c. Installation of air-duct systems.
 - d. Installation of air devices.
 - e. Installation of mechanical system control-air tubing.
 - f. Installation of ceiling support framing.

END OF SECTION 09260

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Ceramic wall tile.
 - 2. Trim units.
 - 3. Mortar and grout.
 - 4. Ceramic Tile Installation Schedule.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 2. Division 9 Section "Gypsum Board Assemblies" for backer units for wall installations.

1.03 SUBMITTALS

- A. Product Data: For each type of tile, mortar, grout, and other products specified. For tile manufacturers and products provided by not specified, provide performance data indicating compliance with requirements specified in Part 2 Article "Tile Products."
- B. Samples for Initial Selection: For each type of grout indicated. Include Samples of accessories involving color selection.
- C. Samples for Verification: Of each item listed below. Where products involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Full-size units of each type of tile, trim and accessory for each color required.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Product Options: This Section indicates finish, size and color requirements for ceramic tile. Other available manufacturers' products with equal aesthetic and performance characteristics may be considered.
 - 1. Refer to Division 1 Section "Product Requirements" for substitution submittals.
 - 2. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with aesthetic and performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.
- C. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

2.02 TILE PRODUCTS

A. Porcelain Ceramic Tile General: Tile shall comply with the following requirements:

1. Nominal Thickness: 5/16 inch.
2. Surface: As described by Basis of Design Product.
3. Face: Unglazed with square edge.
4. Moisture Absorption: Not greater than 0.5 percent.
5. Breaking Strength: Not less than 250 lbs.
6. Surface Hardness: Not less than 7.5 Moh's.
7. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - a. Dry: Greater than or equal to 0.70.
 - b. Wet: Greater than or equal to 0.60.

B. Wall Tile CT-1:

1. Basis-of-Design Product: Subject to compliance with the requirements, provide Terra Classic Accents by Eco Rep Group.
2. Color: Citrine.
3. Module Size: 4 x 4.

C. Wall Tile CT-2:

1. Basis-of-Design Product: Subject to compliance with the requirements, provide Terra Classic by Eco Rep Group.
2. Color: Quartz.
3. Module Size: 4 x 4.

D. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:

1. Base: Coved, module size 8 by 4 inches with the following top:
 - a. Square-top where tile is set continuous above base tile.
 - b. Round-Top where top of base tile terminates at wall substrate finish.
2. Wainscot Cap: Surface bullnose, module size 4 by 4 inches.
3. External Corners: Surface bullnose.
4. Internal Corners: Field-buttet square corners.

2.03 SETTING AND GROUTING MATERIALS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified:

1. Bonsal, W. R., Company.
2. C-Cure.
3. Jamo Inc.
4. LATICRETE International Inc.

5. MAPEI Corporation.
6. Summitville Tiles, Inc.

B. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:

1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
2. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of prepackaged dry-mortar mix and liquid-latex additive complying with the following requirements:
 - a. Latex Additive: Styrene butadiene rubber.
3. Either factory-prepared or site mixed at contractor's option.

C. Latex-Portland Cement Grout:

1. ANSI A118.6 for materials described in Section H-2.4, composed as follows, either at contractor's option:
 - a. Factory-Prepared, Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:
 - 1) Unsanded grout mixture for joints 1/8 inch and narrower.
 - b. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared, dry-grout mix and latex additive complying with the following requirements:
 - 1) Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch and narrower.
 - 2) Latex Additive: Styrene butadiene rubber.
2. Colors: As selected by Architect from manufacturer's full range.

2.04 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints.

2.05 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.06 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.03 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in porcelain ceramic tile installation schedules.

- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (latex-portland cement grouts), comply with ANSI A108.10.

3.04 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Porcelain Ceramic Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
- B. Joint Widths: Install tile on walls with 1/8 inch joint widths:

3.05 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all porcelain ceramic tile surfaces so they are free of foreign matter.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls.

3.06 CERAMIC TILE INSTALLATION SCHEDULE

Location	Element	TCA Installation Method	Water Barrier	Reinforced Mortar Bed or Scratch Coat	Setting Bed	Grout
Interior						
Toilet and Locker Rooms	Walls	W244-E1	NA	NA	Latex-portland cement mortar.	Latex-portland cement grout.
Control, Contraction and Isolation Joints	Vertical Locations	EJ171-E1	See Division 7 Section "Joint Sealants" for material and application.			

END OF SECTION 09310

SECTION 09511

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.03 DEFINITIONS

- A. CAC: Ceiling Attenuation Class.
- B. LR: Light Reflectance coefficient.
- C. NRC: Noise Reduction Coefficient.
- D. Tie wire and hanger wire diameters (uncoated) and corresponding U.S. steel wire gauge shall be as indicated in the table below:

WIRE DIAMETER	
	Minimum Steel Base Metal (Uncoated) Diameter
Gauge	Inch
12	0.1055
11	0.1205
10	0.1350
9	0.1483
8	0.1620

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

- D. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor type.
- E. Maintenance Data: For finishes to include in maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less.
- C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the most restrictive requirements of the following:
 - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580, Severe Seismic Disturbance requirements.
 - 2. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
 - 3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.08 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273.

2.02 NODULAR MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACT-1)

- A. Basis of Design Manufacturer and Product: Subject to compliance with the requirements provide Armstrong World Industries, Inc.; Ultima Lay-In panels or comparable product by one of the following:
 - 1. Celotex Corporation; Architectural Ceilings Marketing Dept.
 - 2. USG Interiors, Inc.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type III, mineral base with painted finish; Form 1, nodular.
 - 2. Pattern: E (lightly textured) I (embossed).
- C. Color: White.
- D. LR: Not less than 0.90.
- E. NRC: Not less than 0.70.
- F. CAC: Not less than 35.
- G. Edge Detail: Square sized to fit flange of exposed suspension system members.
- H. Thickness: 3/4 inch.
- I. Size: 24 by 24 inches.

2.03 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
 - 1. Hanger Attachments to Metal Decking Not Concrete Topped:
 - a. Postinstalled Eye Lag Type Screws: Self-tapping screw fastener designed for use with metal framing. Each fastener shall be about 2 inches long overall and include an integral self-tapping threaded screw, washer, shank and flattened eyelet portion with hole sized to accept suspension wire. Manufacture from 1018 heat-treated steel with electroplated zinc Type II coating.
 - 1) Screws shall comply with following allowable tension load for 20 gage (minimum uncoated thickness of 0.030 inch) metal decking with 38,000 psi minimum yield strength: 170 psi inclusive of 2-1/2 safety factor for steel decking.
 - 2) Use of this screw shall be limited to ceiling systems weighing no more than 2.5 psf.
 - b. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to the following:
 - 1) I-LAG Brand Eye Lag Screws, 750 SD; Doc's Marketing Corp.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.1055 inch diameter (12 gauge) wire.
- E. Seismic Struts (Strut Stabilizer): Manufacturer's standard compression struts designed to accommodate seismic forces.
- F. Vertical Compression Strut: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation.
- G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.04 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Basis of Design Manufacturer and Product: Subject to compliance with the requirements provide Armstrong World Industries, Inc., Inc.; Prelude or comparable product by one of the following:
1. Celotex Corporation; Architectural Ceilings Marketing Dept.
 2. Chicago Metallic Corporation.
 3. USG Interiors
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/653M, not less than G30 coating designation, with prefinished 15/16-inch- wide metal caps on flanges.
1. Structural Classification: Intermediate-duty system.
 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 3. Face Design: Flat, flush.
 4. Cap Material: Steel or aluminum cold-rolled sheet.
 5. Cap Finish: Painted white.

2.05 METAL EDGE MOLDINGS AND TRIM

- A. Available Manufacturers:
1. Armstrong World Industries, Inc.
 2. Celotex Corporation; Architectural Ceilings Marketing Dept.
 3. Chicago Metallic Corporation.
 4. USG Interiors, Inc.
- B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
- C. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
1. Organic Coating: Thermosetting, primer/topcoat system with a minimum dry film thickness of 0.8 to 1.2 mils.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with UBC Standard 25-2 and ASTM E 580, Severe Seismic Disturbance requirements, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - a. Cage vertical hanger with compression strut at locations of splayed brace wires. Secure strut to hanger with double wrap of wire at intervals not exceeding 18 inches o.c.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. Do not attach hangers to steel deck tabs.
 - 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - a. Where attachment to steel roof deck is unavoidable, use postinstalled eye lag type screws fastened only through bottom flute of deck.
 - 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 - 9. Install seismic struts (strut stabilizer) at all perimeter edges of grid.

- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors, or to steel roof deck with postinstalled eye lag type screws fastened only through bottom flute of deck.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Testing Services: Testing and inspecting of completed installations of acoustical panel ceiling hangers shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
- C. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - 1. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Remove and replace acoustical panel ceiling hangers where test results indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.05 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09610

CONCRETE MOISTURE VAPOR EMISSION AND pH TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Description: The work of this Section includes the following:
 - 1. Performing moisture Vapor Emission Testing (VET) in compliance with ASTM E 1907 or ASTM F 1869 and pH testing on new concrete slabs to receive the following resinous or adhesively applied finishes:
 - a. Linoleum floor coverings.
 - b. Resinous Flooring.
 - 2. If areas of new concrete slab are not within maximum allowable vapor emission rate and range of pH recommended by floor covering manufacturer or as indicated in this Sections Article "Examination," whichever is more stringent, then advise General Contractor in writing and request further instructions before proceeding with finishes installation and application.
- B. Related Sections: The following Sections contain requirements that may relate to this Section:
 - 1. Division 9 Section "Linoleum Floor Coverings."
 - 2. Division 9 Section "Acid Resistant Resinous Flooring."

1.03 SUBMITTALS

- A. Prior to VET/pH Phase: Provide the following:
 - 1. Test kit product data and instructions for use.
 - 2. Preliminary Test Diagram: Copy of floor plan(s) indicating proposed VET/pH locations.
 - 3. Copy of proposed VET/pH report.
- B. After VET/pH Phase: Provide the following:
 - 1. Completed Test Diagram: Copy of floor plan(s) indicating actual VET/pH locations.
 - 2. VET/pH Report: Copies of complete VET/pH reports for all locations tested: Include name of company performing the test; types of testing instruments used, starting date, time, and beginning weight; estimate of building temperature; stopping date, time, and ending weight; and computed pounds of emission, including equations.

C. Where VET indicates that application of topical vapor retarder is required, provide the following:

1. Product Data: Furnish Manufacturers product data defining product and system properties, limitations, installation method and warranties.
2. Submit copy of Manufacturers Warranty and evidence of product liability insurance policy, showing compliance with Part 1 Article "Warranties."

1.04 QUALITY ASSURANCE

A. VET/pH Testing Service Qualifications: Comply with requirements specified in Division 1 Section "Quality Requirements." VET/pH shall be conducted by Testing Service or other qualified personnel with a minimum of 5 years VET/pH experience.

B. Product Options: Performance of vapor emission and pH testing kit is based on the specific system indicated in this Section. Manufacturers' systems other than that specified in Part 2 with equal performance characteristics may be considered. Refer to Division 1 Sections "Product Options" prior to acceptance of Bids and "Product Substitution Procedures" after award of Contract.

1. Do not modify intended performance standards, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.05 PROJECT CONDITIONS

A. For VET and pH Testing: Environmental requirements of area to be tested are to match that of the finished floor covering. Doors, windows, roofing, etc. must be installed and the temperature of the building controlled to a finished building atmosphere. Do not execute tests when building interior is below 65 degrees F for 72 hours prior to, and throughout the duration of the tests.

PART 2 - PRODUCTS

2.01 VET TEST KIT

A. General: Provide moisture test kit designed to quantitatively measure the rate of moisture (water) vapor emission from a substrate such as concrete floors.

B. Test Kit: Calcium chloride test kit equipped with a sealed dish of anhydrous calcium chloride, a metering dome with gasket and instructions.

1. Test kits shall be prepackaged and of commercial consistency. Factory pre-weighed measurements are not acceptable for test purposes.
2. Test kits shall be compatible for use with test method ASTM E 1907 or ASTM F 1869.

C. The number of test kits required shall be determined by the square footage of the facility scheduled for application of floor coverings specified in Part 1. A minimum of three test kits are required in the first 1,000 sq. ft. and a minimum of one test kit per each additional 1,000 sq. ft. with consideration given to separation of test areas.

- D. Basis of Design Manufacturer: Subject to compliance with the requirements provide product by Moisture TestKit Company; Castro Valley, CA; 1-888-216-8378 or comparable product by one of the following manufacturers:
- a. Taylor Tools; A Div. of Roofing Equipment Inc.
 - b. Vaprecision, Inc.
- E. Accessories: Provide tools recommended by test kit manufacturer for use in performing VAT, including but not limited to the following:
1. Razor scraper, wire brush, utility knife.
 2. Safety goggles, protective gloves,
 3. Cloth rags.
 4. Scale capable of measuring to nearest 0.1 gram.

2.02 pH TEST

- A. pHydriion paper and color chart with colors in increments from 1 to 14.
- B. Available Manufacturers: Subject to compliance with the requirements provide products by one of the following:
1. Moisture TestKit Company; Castro Valley, CA; 1-888-216-8378 or equal.
 2. Taylor Tools; A Div. of Roofing Equipment Inc.
 3. Vaprecision, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Vapor Emission (VET) and pH Testing:
1. Determine the level of moisture vapor emission and pH by use of anhydrous calcium chloride and pH test kits, administered by a qualified testing agency or person.
 2. Perform three tests for the first 1,000-sq. ft. of flooring and one additional test for each additional 1,000-sq. ft. of flooring. Conduct around the perimeters of the room, at columns and where moisture may be evident.
 3. VET Tests shall determine the change in weight of moisture-absorbing anhydrous calcium chloride and the results shall represent the amount of moisture transmitting out of the concrete slab area. The value shall be expressed in pounds and shall be equivalent to the weight of the water that is emitted from a 1,000 sq. ft. concrete slab area in a 24-hour period of time.
 4. Following is a brief summary of typical VET procedure using test kit specified in Part 2. Comply with written procedures required by other test kit manufacturers as required. Refer also to ASTM E 1907 or ASTM F 1869 for additional requirements.
 - a. Remove foreign objects including coatings, overlays, paints or floor coverings from the concrete surface using mechanical devices including razor scrapers, wire brush and grinders.
 - b. Carefully remove black vinyl tape from the plastic container that holds the calcium chloride crystals and weigh the container including the calcium

- chloride crystals to the nearest 0.1-gram. Record original weight on the top of the container label (W1).
- c. Carefully remove lid of the container that holds anhydrous calcium chloride crystals and place the lid underneath the container at the middle of the test area.
 - d. On the cover label, record the time and date the test was started (T1).
 - e. Remove the paper backing from the black sealant that is around the plastic cover and install the cover over the container on a dust-free concrete surface. To test for an airtight seal, press firmly on the center of the cover. The cover should resist pressure, if properly sealed.
 - f. Allow the test kit to remain undisturbed for a period of 60 hours minimum to 72 hours maximum, after which, remove the plastic cover and immediately place the lid back on the container. Record date and time (T2).
 - g. Weigh the container with calcium chloride (W2) at site. If the container needs to be transported for weighing, then seal with the original black vinyl tape or similar tape. Remove the tape prior to weighing. Do not spill any of the calcium chloride crystals from the container. If any is spilled, the test must be rerun with a new pre-weighed test kit.
 - h. Calculate exposure time in hours: $T = T2 - T1$.
 - i. Calculate weight gain of calcium chloride in grams: $\Delta M = W2 - W1$.
5. pH test shall determine subfloor alkalinity conditions: pHydriion paper shall be applied to subfloor wetted with potable water in accordance with test kit instructions. Color of paper shall be compared to pH color chart to determine alkalinity.
 6. Record calculations and other data on VET/pH forms for submittal as specified.
- B. If calcium chloride testing reveals water vapor emission levels greater than 3-pounds per 1,000-sq. ft. for resilient flooring and resinous flooring, then advise General Contractor in writing and request further instructions before proceeding with finishes installation and application.
- C. If pH range is less than 5 or greater than 9 then advise General Contractor in writing and request further instructions before proceeding with finishes installation and application.

END OF SECTION 09610

SECTION 09611

FLUID APPLIED CONCRETE SEALER, DENSIFIER AND HARDENER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes clear penetrating liquid floor treatment formulated to seal, densify and harden finished concrete slab surfaces in interior locations where C is designated on the Drawings. Include protection of concrete slab and deck surfaces prior to sealer application.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for placing and finishing cast-in-place concrete receiving sealer.

1.03 SUBMITTALS

- A. Product Data: Including product specifications; preparation and application instructions; recommendations, storage and handling requirements; and maintenance instructions.
- B. Certification: By the manufacturer that products supplied comply with regulations controlling use of volatile organic compounds (VOCs).
- C. Written certification from manufacturer of concrete finish coatings that applicator is licensed and qualified to apply concrete finish coatings.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
 - 1. Installer shall be capable of providing an adequate number of skilled workers trained and familiar with application requirements.
 - 2. Installer shall provide manufacturer's field technician on site to advise on application procedures.
- B. Regulatory Requirements: Comply with provisions of air-pollution regulations of authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing and application.

- B. Store materials in cool, dry area. Protect from freezing.

1.06 PROJECT CONDITIONS

A. Environmental Limitations:

1. Maintain a temperature of not less than 50 deg F or more than 90 deg F in spaces to receive concrete finish coatings for at least 48 hours before application, during application, and for at least 48 hours after application, unless manufacturer's written recommendations specify longer time periods. After post-application period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
2. Comply with manufacturer's written instructions for moisture content, humidity, ventilation, and other conditions affecting coatings performance.
 - a. Close spaces to traffic during concrete finish coating application and for time period after application recommended in writing by manufacturer.
 - b. Where elevator equipment, mechanical equipment, electrical equipment, storage shelving and other items are indicated for installation on top of coated concrete finishes, apply finish coats before these items are installed.
 - c. Do not use liquid curing materials over concrete surfaces to receive concrete finish coatings. Concrete flatwork shall be cured with new and unwrinkled, nonstaining, high-quality curing paper in accordance with Manufacturer written instructions, or other method approved in writing by the concrete finish coating material Manufacturer.
 - 1) General Contractor shall coordinate concrete curing method for areas indicated on Contract Documents to have concrete finish coating.

1.07 SLAB PROTECTION FOR CONCRETE NOT YET SEALED

- A. Provide protection of all concrete surfaces to be sealed, in a manner acceptable sealer Manufacturer and Applicator, that ensures that surface of concrete is maintained in condition without damage, deterioration, discoloring or other surface imperfections that would impair aesthetic effect of final finish.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Sealer: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces. Comply with the following:
 1. Aqueous blend of silicates complying with ASTM D-4060-90.
 2. Penetrating sealer must not exhibit a wear index greater than 0.6 when 500 cycles of abrasion with abrasive wheel number C-18 are recorded.
 3. Product shall be approved by USDA for food handling facilities and for resistance to chemical staining.
 4. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. L.M. Scofield Systems
- b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
- c. Curecrete Distribution Inc.; Ashford Formula.
- d. L&M Construction Chemicals, Inc.; Seal Hard.
- e. US Mix Products Company; US Spec Industraseal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with applicator present, for compliance with requirements for conditions affecting application of concrete sealer. Do not proceed with application until unsatisfactory conditions have been corrected.
 1. Notify the Architect of problems anticipated prior to application of concrete sealer.
 2. Start of application will be construed as the Applicator's acceptance of surfaces within that particular area.

3.02 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of concrete sealer. Remove oil, curing compounds, laitance, and other substances that could prevent penetration of concrete sealers.
- B. Fill voids and cavities in concrete slabs and decks using materials compatible with concrete and sealer, and that will not delay construction schedule.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of concrete sealer. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of concrete sealer being deposited on surfaces.
- D. Coordination with Sealants: Do not apply concrete sealer until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, concrete sealer, and sealant materials identical to those used in the work.

3.03 APPLICATION

- A. Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Apply to concrete as soon as feasible in accordance with manufacturer's recommendations, but not until concrete has cured for at least seven days.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry.

- B. Minimum Application Rate: Apply at no less than the manufacturer's recommended coating rate.

3.04 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean concrete sealer from adjoining surfaces and surfaces soiled or damaged by sealer application as work progresses. Repair damage caused by sealer application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 09611

SECTION 09612

SLIP RESISTANT STAIR TREAD STRIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes surface preparation and application of high-performance, slip-resistant coating on stair treads.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Selection: Manufacturer's color charts showing the full range of colors available.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.05 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

PART 2 - PRODUCTS

2.01 EPOXY COATINGS

- A. Slip Resistant, Epoxy, Cold-Cured:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Interstate Products, Inc.; Sure Foot Slip Resistant Epoxy Coating #910-915.
- B. Color: As selected by Architect from manufacturer's available colors.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written recommendations to produce clean, dust-free, dry substrate for traffic coating application.
- B. Mask adjoining surfaces not receiving traffic coatings to prevent spillage, leaking, and migration of coatings.

3.02 TRAFFIC COATING APPLICATION

- A. Apply traffic coating material according to manufacturer's written recommendations.

3.03 CLEANING AND PROTECTION

- A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- B. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 09612

SECTION 09653

RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

- 1. Wall base.
- 2. Molding accessories.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.05 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 RESILIENT WALL BASE (RB-)

- A. Basis of Design Manufacturer and Product: Subject to compliance with the requirements provide Johnsonite; color indicated on Drawing's Material Finish Legend or comparable product with matching color by one of the following:
 - 1. Allstate.
 - 2. Burke.
 - 3. Roppe.
- B. Wall Base: ASTM F 1861.
- C. Type (Material Requirement): TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
- D. Group (Manufacturing Method): I (solid)
- E. Style: Cove (with top-set toe).
- F. Minimum Thickness: 0.125 inch.
- G. Height: 4 inches.
- H. Lengths: Coils in manufacturer's standard length.
- I. Outside Corners: Job formed or premolded.
- J. Inside Corners: Job formed or premolded.
- K. Surface: Smooth.

2.02 RESILIENT ACCESSORIES

- A. Rubber Accessory Molding: Provide accessory molding complying with the following requirements.
 - 1. Material and Product Descriptions: Where rubber is specified in the following product descriptions, then available manufacturers shall provide only rubber accessories. Where vinyl is specified, then available manufacturers may provide either vinyl or rubber at their option.
 - a. Rubber carpet edge for glue-down applications; Johnsonite EG-XX-G, H or J Series or equal by other available manufacturer.
 - b. Vinyl reducer strip for resilient flooring; Johnsonite CRS-XX-B or equal by other available manufacturer.
 - c. Rubber resilient flooring and carpet joiner; Johnsonite CTA-XX-A, C or D Series or equal by other available manufacturer.
 - 2. Profile and Dimensions: As specified by product designation indicated above and as required for application.
 - 3. Colors: As selected by Architect from manufacturers full range.

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers that may be incorporated into the Work include, but are not limited to the following:
 - 1. Armstrong World Industries.
 - 2. Burke.
 - 3. Johnsonite.
 - 4. Roppe.
 - 5. VPI; Floor Products Division.

2.03 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturers for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates for Stair Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. Install wall base by job forming or by using premolded corners.
- F. Job-Formed Corners:
1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.04 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of

construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over stair accessories. Place plywood or hardboard panels over surfaces and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09653

SECTION 09654

LINOLEUM FLOOR COVERINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes linoleum floor tile and sheet floor coverings.
- B. Related Sections include the following:
 - 1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with linoleum floor coverings.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Show locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each color and pattern of linoleum floor covering required.
 - 1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- D. Heat-Welded Seam Samples: For each flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to rigid backing and prepared by Installer for this Project.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For linoleum floor coverings to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project that are competent in techniques required by manufacturer for floor covering installation indicated.
- B. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.
 - 1. Floor Tile: Store on flat surfaces.
 - 2. Sheet Floor Covering: Store rolls upright.

1.06 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods:
 - 1. 72 hours before installation.
 - 2. During installation.
 - 3. 72 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 72 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof of each type, color, and pattern of floor tile installed.
 - 2. Sheet Floor Covering: Furnish not less than 10 linear feet in full roll width for every 500 linear feet or fraction thereof, in roll form and in full roll width, of each different type, color, and pattern of sheet floor covering installed.

PART 2 - PRODUCTS

2.01 LINOLEUM FLOOR COVERING

- A. Basis of Design Product: Subject to compliance with the requirements, provide product indicated on Drawing's Material Finish Legend or comparable product by another manufacturer.
- B. Sheet Floor Covering: ASTM F 2034.
 - 1. Roll Size: In manufacturer's standard length by not less than 78 inches wide.

- C. Seaming Method: Heat welded
- D. Thickness: 0.10 inch.
- E. Fire-Test-Response Characteristics:
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

2.02 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by floor covering manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor covering manufacturer for products and substrate conditions indicated.
- C. Heat-Welding Bead: Solid-strand product of floor covering manufacturer.
 - 1. Color: Match Armstrong W1746, Canadian Gold.
- D. Metal Edge Strips: Extruded aluminum with mill finish, of width shown, of height required to protect exposed edge of floor covering, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3. Moisture Testing:

- a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft in 24 hours.
 - b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move floor coverings and installation materials into spaces where they will be installed at least 72 hours in advance of installation.
1. Do not install floor coverings until they are same temperature as space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION, GENERAL

- A. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- B. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- C. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on subfloor. Use chalk or other nonpermanent marking device.
- D. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- E. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

3.04 SHEET FLOOR COVERING INSTALLATION

- A. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.

B. Lay out sheet floor coverings as follows:

1. Maintain uniformity of floor covering direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams.
5. Eliminate deformations that result from hanging method used during drying process (stove bar marks).

3.05 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing floor coverings:

1. Remove adhesive and other surface blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.
 - a. Do not wash floor coverings until after time period recommended by manufacturer.

B. Protect floor coverings against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by manufacturer.

1. Apply protective floor polish to surfaces that are free of soil, visible adhesive, and surface blemishes.
 - a. Seal linoleum as recommended by manufacturer but with not less than three coats of floor polish.
 - b. Use commercially available product acceptable to manufacturer.
2. Cover linoleum floor coverings with undyed, untreated building paper until inspection for Substantial Completion.
 - a. Allow drying room film (yellow film caused by linseed oil oxidation) to disappear before Substantial Completion.
3. Do not move heavy and sharp objects directly over floor covering surfaces. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09654

SECTION 09671

ACID RESISTANT RESINOUS FLOORING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies battery acid resistant, seamless, epoxy-resin flooring for application in Battery Room M133 and includes the following:
 - 1. Preparation of flooring substrate including the following:
 - a. Shot-blast abrading.
 - b. Chasing.
 - 2. Priming, base and finish coat application.
 - 3. Integral cove base.
 - 4. Protection to adjacent materials and surfaces.
 - 5. Cleaning surfaces and areas of work.
- B. Application: Provide
- C. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for concrete substrates to receive resinous flooring.
 - 2. Division 7 Section "Joint Sealants" for joint sealant for interior traffic bearing concrete slab on grade pavements.
 - 3. Division 9 Section "Concrete Moisture Vapor Emissions And pH Testing" for testing procedures.

1.03 SUBMITTALS

- A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each resinous flooring system indicated.
- C. Samples for Verification: Of each resinous flooring system required, 6 inches square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Product Schedule: Use designations indicated in the Resinous Flooring Schedule and room designations indicated on Drawings in product schedule.

- E. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results of the resinous flooring's reaction to chemicals and other reagents and substantiating compliance with requirements.
- F. Material Certificates: In lieu of material test reports, when permitted by Contracting Officer, signed by manufacturers certifying that materials furnished comply with requirements.
- G. Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer.
 - 1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for installing resinous flooring systems specified.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.06 PROJECT CONDITIONS

- A. Concrete substrate shall have cured 30 days minimum utilizing a dissipating curing membrane. Concrete subfloors on or below grade shall be adequately water-protected from beneath and at the perimeter of the slab. Concrete shall have a light broom finish.
- B. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- C. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- D. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.07 WARRANTY

- A. Furnish a single, written warranty covering both material and workmanship for a period of one full year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Resinous Flooring: Resinous floor surfacing system consisting of primer; intermediate (base) coat, and top (seal) coat. including resin, hardener and colorants, if any. Comply with requirements indicated in Part 2 Article "Resinous Flooring".
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated, and for producing cove base.

2.02 RESINOUS FLOORING

- A. Available Manufacturers and Products: Subject to compliance with requirements, provide one of the following:
 - 1. Carboline Co.; Floorshield, Heavy Duty, Chemical Resistant Novolac Architectural Floor Coating System with 145-SL Intermediate and Top Coat.
 - 2. General Polymers; Epoxy Floor Coatings, 3744P High Performance CR Epoxy Intermediate and Top Coat.
 - 3. PPG; Aquapon Polyamide-Epoxy Coatings with 97-130 Series Intermediate and Top Coat.
 - 4. Tnemec Company, Inc.; 100 Percent Solid Epoxy/Novalac Epoxy System with Series 282 Tneme-Glaze Intermediate and Topcoats.
 - 5. Plasite, a div. of StonCor; Semstone 602 with 600 Series Mortarcoat and 600 Series Topcoat.
- B. Provide resinous flooring system complying with the following
 - 1. Color and Pattern: As selected by Contracting Officer from manufacturer's full range of colors and patterns produced for resinous flooring complying with requirements indicated.
 - 2. Total System Thickness: 18 mils minimum.
 - 3. Wearing Surface: Smooth low luster or semigloss.
 - 4. Base: 6-inch- high integral cove base.

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.

- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Determine dryness and pH characteristics by performing moisture and pH tests specified in Division 9 Section "Concrete Moisture Vapor Emission And pH Testing."
 - 2. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - 3. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 - 4. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Chasing: Areas where the installed floor does not abut against a vertical surface or adjacent surface applied flooring shall be chased.
 - 1. The chase shall be 3/4-inch wide chiseled to a straight, saw-cut, 1/4-inch depth.
- D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- E. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- F. Treat nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.02 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate to achieve dry film thickness indicated.
- C. Apply reinforcing membrane to substrate cracks.
- D. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.

- E. Apply intermediate (base) coat, and top (seal) coat to produce smooth finish. Apply in no less than 2 coats and at spreading rates recommended in writing by manufacturer to achieve minimum dry film thickness indicated.

3.03 CLEANING AND PROTECTING

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION 09671

SECTION 09910

INTERIOR PAVEMENT MARKING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes interior pavement-marking paint.
- B. Related Sections include the following:
 - 1. Division 2 Section "Pavement Striping And Marking" for stripe painting on exterior asphalt and concrete paving.

1.03 SUBMITTALS

- A. Product Data: For each paint system specified. Include also the following:
 - 1. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

1.04 QUALITY ASSURANCE

- A. Paint markings shall not fade, crack, flake or peel within the paint manufacturer's standard warranty period.
- B. Traffic marking paint shall be lead free composition.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.06 PROJECT CONDITIONS

- A. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50 deg F for water-based materials, and not exceeding 95 deg F. Painting shall be discontinued during periods of high wind or when inclement weather threatens to interrupt normal progress of the Work
 - 1. Allow concrete pavement to cure for 28 days before starting pavement marking.

PART 2 - PRODUCTS

2.01 PAINT

- A. Pavement-Marking Paint: Latex, water-base emulsion, ready-mixed.
 - 1. Available Products: Subject to compliance with the requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - a. Benjamin Moore & Co.; M58 Series Safety & Zone Marking Latex.
 - b. Sherwin Williams; Setfast Fast Dry Latex Traffic Marking Paint, TM2000 Series.

2.02 COLOR

- A. Color for on-site pavement marking shall be white except as follows:
 - 1. Where indicated on Drawings provide white, yellow, red, blue or black.

PART 3 - EXECUTION

3.01 PAVEMENT MARKING

- A. Pavement markings shall be applied over the finished concrete surfaces. See Drawings for locations and dimensions.
- B. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- C. Surface Preparation: Dirt, clay, silt, sand and other loose material shall be removed from the pavement prior to the application of paint.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges and no overspray. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 10 mils, or greater if recommended by paint manufacturer.
- E. Beneficial Occupancy: Newly painted surfaces shall be protected from damage by vehicles during the time required for paint to harden sufficiently to prevent displacement or pickup by tires of vehicular traffic. If paint has not hardened sufficiently in 90 minutes, painting operations shall cease until the reason for slow drying has been corrected.

END OF SECTION 09910

SECTION 09911
EXTERIOR PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
- B. Related Sections include the following:
 - 1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
 - 2. Division 8 Sections for factory priming windows and doors with primers specified in this Section.
 - 3. Division 9 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.04 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved

- Products List."
2. Preparation and Workmanship:
 - a. New Work: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
 - B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.06 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited

to, the following:

1. Benjamin Moore & Co.
2. California Paints.
3. Diamond Vogel Paints.
4. Dunn-Edwards Corporation.
5. Frazee Paint.
6. ICI Paints.
7. Kelly-Moore Paints.
8. PPG Architectural Finishes, Inc.
9. Sherwin-Williams Company (The).

2.02 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: Match colors indicated on Drawing's Finish Legend.

2.03 METAL PRIMERS

A. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

B. Inorganic Zinc Rich Primer: MPI #19.

2.04 EXTERIOR LATEX PAINTS

A. Exterior W.B. Light Industrial Coating: MPI #163.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in MPI manual indicated below as applicable to substrates and paint systems indicated.
 - 1. New Work: Comply with requirements in "MPI Architectural Painting Specification Manual" for paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.04 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance of paint materials with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.05 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
1. W.B. Light Industrial Coating (Over Inorganic Zinc): MPI EXT 5.1B
 - a. Prime coat: Inorganic zinc rich primer. MPI #19
 - b. Intermediate Coat: Exterior W.B. light industrial coating. MPI #163
 - c. Topcoat: Exterior W.B. light industrial coating. MPI #163
- B. Galvanized-Metal Substrates:
1. W.B. Light Industrial Coating (Over W.B. Primer): MPI EXT 5.3J
 - a. Prime coat: Waterborne galvanized-metal primer. MPI #134
 - b. Intermediate Coat: Exterior W.B. light industrial coating. MPI #163
 - c. Topcoat: Exterior W.B. light industrial coating. MPI #163

END OF SECTION 09911

SECTION 09912

INTERIOR PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Galvanized metal.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Gypsum board.
 - 7. Cotton or canvas insulation covering.
- B. Related Sections include the following:
 - 1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
 - 2. Division 8 Sections for factory priming windows and doors with primers specified in this Section.
 - 3. Division 9 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.04 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship:
 - a. New Work: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

- ### A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.06 PROJECT CONDITIONS

- ### A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- ### B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.07 EXTRA MATERIALS

- ### A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Benjamin Moore & Co.
 2. California Paints.
 3. Coronado Paint.
 4. Diamond Vogel Paints.
 5. Dunn-Edwards Corporation.
 6. Duron, Inc.
 7. Frazee Paint.
 8. ICI Paints.
 9. Kelly-Moore Paints.
 10. PPG Architectural Finishes, Inc.
 11. Sherwin-Williams Company (The).

2.02 PAINT, GENERAL

- A. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As indicated in a color schedule.

2.03 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
1. VOC Content: E Range of E3.
- B. Epoxy Block Filler: MPI #116.
1. VOC Content: E Range of E3.

2.04 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- B. Epoxy Cold Cured Gloss: MPI #77.

2.05 METAL PRIMERS

- A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E2.
- B. Rust-Inhibitive Primer (Water Based): MPI #107.
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- C. Cementitious Galvanized-Metal Primer: MPI #26.
 1. VOC Content: E Range of E1.
- D. Waterborne Galvanized-Metal Primer: MPI #134.
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- E. Quick-Drying Primer for Aluminum: MPI #95.
 1. VOC Content: E Range of E3.
- F. Inorganic zinc rich primer: MPI #19.
 1. VOC Content: E Range of E3.
- G. Waterborne Dry Fall: MPI #133.
 1. VOC Content: E Range of E3
 2. Environmental Performance Rating: EPR 3.

2.06 LATEX PAINTS

- A. Interior Latex (Flat): MPI #53 (Gloss Level 1).
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 2.5.
- B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- C. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- D. Interior Latex (Satin): MPI #43 (Gloss Level 4).
 1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.5.
- E. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 4.
- F. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 4.
- G. High-Performance Architectural Latex (Low Sheen): MPI #138 (Gloss Level 2).
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 6.
- H. High-Performance Architectural Latex (Eggshell): MPI #139 (Gloss Level 3).
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 6.
- I. High-Performance Architectural Latex (Satin): MPI #140 (Gloss Level 4).
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 6.5.
- J. High-Performance Architectural Latex (Semigloss): MPI #141 (Gloss Level 5).
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 7.

2.07 DRY FOG/FALL COATINGS

- A. Latex Dry Fog/Fall: MPI #118.
1. VOC Content: E Range of E3.
 2. Environmental Performance Rating: EPR 3.
- B. Waterborne Dry Fall: MPI #133.
1. VOC Content: E Range of E3
 2. Environmental Performance Rating: EPR 3.
- C. Interior Alkyd Dry Fog/Fall: MPI #55.
1. VOC Content: E Range of E3.

2.08 EPOXY AND POLYURETHANE PAINTS

- A. Epoxy Cold Cured gloss: MPI #77.
- B. Interior/Exterior Epoxy (Water Based): MPI #115.
- C. Polyurethane, 2 Component, Pigment Gloss: MPI #72.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in MPI manual indicated below as applicable to substrates and paint systems indicated.
 - 1. New Work: Comply with requirements in "MPI Architectural Painting Specification Manual" for paint systems indicated.
- A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- D. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Aluminum Substrates: Remove surface oxidation.
- H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- I. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.
 - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.04 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.05 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 1. Epoxy (“Tile Like”) (For Smooth Concrete) System: MPI INT 3.1F.
 - a. Prime Coat: Epoxy cold cured gloss. MPI #77
 - b. Intermediate Coat: Epoxy cold cured gloss. MPI #77
 - c. Topcoat: Prime Coat: Epoxy cold cured gloss. MPI #77
- B. CMU Substrates:
 1. Latex System: MPI INT 4.2A.

- a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex, gloss level as shown on Drawings.
2. High-Performance Architectural Latex System: MPI INT 4.2D.
- a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex, gloss level as shown on Drawings.
3. Epoxy, W.B. (“Tile Like”) System: MPI INT 4.2J.
- a. Prime Coat: Interior/exterior latex block filler. MPI #4
 - b. Intermediate Coat: Interior/exterior epoxy (water based). MPI #115
 - c. Topcoat: Interior/exterior epoxy (water based). MPI #115
4. Epoxy (“Tile Like”) (For Wet Environments) System: MPI INT 4.2G.
- a. Prime Coat: Epoxy block filler. MPI #116
 - b. Intermediate Coat: Epoxy cold cured gloss. MPI #77
 - c. Topcoat: Epoxy cold cured gloss. MPI #77

C. Steel Substrates:

1. Water-Based Dry-Fall System: MPI INT 5.1C.
- a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Topcoat: Latex dry fog/fall.
2. Alkyd Dry-Fall System: MPI INT 5.1D.
- a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Topcoat: Interior alkyd dry fog/fall.
3. Latex Over Alkyd Primer System: MPI INT 5.1Q.
- a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex gloss level as shown on Drawings.
4. High-Performance Architectural Latex System: MPI INT 5.1R.
- a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex gloss level as shown on Drawings.
1. Epoxy, W.B. System: MPI INT 5.1K.
- a. Prime Coat: Rust inhibitive primer (water based). MPI #107
 - b. Intermediate Coat: Interior/exterior epoxy (water based). MPI #115
 - c. Topcoat: Interior/exterior epoxy (water based). MPI #115

2. Polyurethane, Pigmented (over inorganic zinc and epoxy) System: MPI INT 5.1H.
 - a. Prime Coat: Inorganic zinc rich primer. MPI #19
 - b. Intermediate Coat: Epoxy cold cured gloss. MPI #77
 - c. Topcoat: Polyurethane, 2 component, pigment gloss. MPI #72

B. Galvanized-Metal Substrates:

1. Water-Based Dry-Fall System: MPI INT 5.3H.
 - a. Prime Coat: Waterborne dry fall. MPI #133
 - b. Topcoat: Waterborne dry fall. MPI #133
2. Alkyd Dry-Fall System: MPI INT 5.3F.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Topcoat: Interior alkyd dry fog/fall.
3. Latex System: MPI INT 5.3A.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex gloss level as shown on Drawings.
4. High-Performance Architectural Latex System: MPI INT 5.3M.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex, gloss level as shown on Drawings.

C. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System: MPI INT 5.4H.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex gloss level as shown on Drawings
2. High-Performance Architectural Latex System: MPI INT 5.4F.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex gloss level as shown on Drawings.

D. Gypsum Board Substrates:

1. Latex System: MPI INT 9.2A.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Interior latex matching topcoat.

- c. Topcoat: Interior latex, gloss level as shown on Drawings..
- 2. High-Performance Architectural Latex System: MPI INT 9.2B.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex, gloss level as shown on Drawings.
- 3. Epoxy, W.B. (“Tile Like”): MPI INT 9.2F:
 - a. Prime Coat: Interior latex primer/sealer. MPI #50
 - b. Intermediate Coat: Interior/Exterior epoxy (water based). MPI #115
 - c. Intermediate Coat: Interior/Exterior epoxy (water based). MPI #115
- E. Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings .
 - 1. Latex System: MPI INT 10.1A.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex, gloss level as shown on Drawings.

END OF SECTION 09912

**SANTA CRUZ METROPOLITAN
TRANSIT DISTRICT
METROBASE PROJECT
MAINTENANCE BUILDING**

***Golf Club Drive
Santa Cruz, California***



METRO IFB No. 06-01

VOLUME 3 of 3
Divisions 10 through 16

Construction Documents Project Manual

Construction Documents dated June 29, 2006
(IFB dated August 22, 2006)

Architect's Project No.: 6040-1569-01



800 Wilshire Boulevard; Suite 400
Los Angeles, California 90017

DOCUMENT 00005

CERTIFICATIONS PAGE

Santa Cruz Metropolitan Transit District
Metrobase Project, Maintenance Building

Volume 3 of 3: Introductory Information, Divisions 10 through 16

We hereby certify that these Contract Documents have been prepared by us or under our direct supervision in accordance with the rules and regulations governing the Architects and Engineers practicing in the State of California.

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DOCUMENT 00006

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Metrobase Project, Maintenance Building

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SECTION 10101
MARKERBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes markerboards.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include sections of typical trim members.
- C. Samples for Initial Selection: For each type of marker board surface indicated and as follows:
 - 1. Samples of accessories involving color selection.
- D. Maintenance Data: For marker boards to include in maintenance manuals.
- E. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of marker board through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-built marker boards, including factory-applied trim where indicated, completely assembled in one piece.
- B. Store marker board units vertically with packing materials between each unit.

1.06 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.

- b. Surfaces become slick or shiny.
 - c. Surfaces exhibit crazing, cracking, or flaking.
2. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
 - 1. Color: White.
 - 2. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
- B. Hardboard: AHA A135.4, tempered.
- C. Particleboard: ANSI A208.1, Grade 1-M-1, made with binder containing no urea formaldehyde.
- D. Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
- E. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.02 MARKERBOARD ASSEMBLIES

- A. Porcelain-Enamel Markerboard Assembly: Balanced, high-pressure, factory-laminated markerboard assembly of 3-ply construction consisting of backing sheet, core material, and minimum 0.013 inch thick, porcelain-enamel face sheet with low-gloss finish.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AARCO Products, Inc.
 - b. ADP/Lemco, Inc.
 - c. Best-Rite Manufacturing.
 - d. Claridge Products & Equipment, Inc.
 - e. Ghent Manufacturing Inc.
 - f. Marsh Industries, Inc.
 - g. PolyVision Corporation.
 - 2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
 - 3. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
 - 4. Width: As indicated on Drawings.
 - 5. Height: As indicated on Drawings.

2.03 MARKERBOARD ACCESSORIES

- A. Aluminum Frames: Fabricated from not less than 0.062 inch thick, extruded aluminum; of size and shape indicated.
 - 1. Factory-Applied Trim: Manufacturer's standard baked-enamel or powder-coat finish.
 - 2. Color: As selected by Architect from full range of industry colors and color densities.
- B. Chalktray: Manufacturer's standard, continuous, solid type, extruded aluminum with ribbed section and smoothly curved exposed ends.
- C. Map Rail: Provide the following accessories:
 - 1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide.
 - 2. End Stops: Located at each end of map rail.
 - 3. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.

2.04 FABRICATION

- A. Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- B. Factory assemble marker boards. Frames and accessories shall be assembled and attached to marker units at manufacturer's factory before shipment.
- C. Aluminum Frames and Accessories: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to neat, hairline closure.

2.05 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.
- D. Powder-Coat Finish: Apply manufacturer's standard baked finish, complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance.
- B. Examine walls and partitions for proper backing for marker boards.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove dirt, scaling paint, projections, and depressions that will affect smooth, finished surfaces of marker boards.

3.03 INSTALLATION

- A. General: Install marker boards on walls in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Attach marker boards using concealed clips, hangers, and grounds to wall surfaces and to marker boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.

3.04 CLEANING AND PROTECTION

- A. Clean marker boards according to manufacturer's written instructions. Attach one cleaning label to marker board surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect marker boards after installation and cleaning.

END OF SECTION 10101

SECTION 10195

CHASSIS WASH CURTAINS AND CURTAIN TRACKS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Curtain tracks and curtain carriers.
 - 2. Overspray curtains.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for structural supports.
- C. Include details on blocking in walls.

1.03 PERFORMANCE REQUIREMENTS

- A. Curtains: Provide curtain fabrics with the following characteristics:
 - 1. Fabrics are flame resistant and are identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Identify fabrics with appropriate markings of applicable testing and inspecting agency.
 - 2. Fabrics are water repellent, mildew and rot resistant, and resistant to most chemicals.

1.04 SUBMITTALS

- A. Product Data: Include durability, fade resistance, and fire-test-response characteristics for each type of curtain fabric indicated.
 - 1. Include data on each type of applied curtain treatment.
- B. Shop Drawings: Show layout and sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
- C. Samples for Verification: Samples of each type of the following products:
 - 1. Opaque Fabric: 12-inch- square swatch or larger Sample as required to show complete logo design.
 - 2. Clear Vinyl: 12 inch square of clear vinyl

3. Track and Accessories: Not less than 4 inches long or one unit of each type of track and required accessories
4. Curtain Carrier: Full-size unit.

D. Maintenance Data: For tracks and curtains to include in maintenance manuals specified in Division 1.

1.05 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mockups of typical wash bay, complete with track and curtain, as shown on Drawings.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install cubicles until spaces are enclosed and weatherproof and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where cubicles are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Curtain Carriers and Track Accessories: Full-size units equal to 3 percent of amount installed, but not less than 10 units.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Subject to the requirements of this specification, provide Wash Bay Curtains by Goff's Enterprises, Inc., or a comparable product, as judged solely by the Architect, from another manufacturer.

2.02 CURTAIN TRACKS AND ACCESSORIES

- A. Steel Track: 16 gauge steel track and accessories
1. Curved Track: Factory fabricated with manufacturer's standard radius bends.
 2. Finish: Galvanized .

- B. Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
 - 1. End Stop: Nonremovable.
 - 2. Track Splice: Manufacturer's standard
 - 3. Track Connector: Manufacturer's standard
- C. Curtain Carriers: Manufacturer's standard nylon roller hook

2.03 CURTAINS

A. Curtain Fabric:

- 1. Lower Curtain: Opaque, reinforced vinyl
 - a. Weight: ASTM D 3776, 14 oz per square yard
 - b. Tensile strength: ASTM D 5034, MD-365 lbs x CD-348 lbs
 - c. Tear strength: ASTM D-2261, MD-92 lbs x CD-83 lbs
 - d. Adhesion: ASTM D 751, 28 lbs/2 in
 - e. Fire retardancy: NFPA-701
 - f. Mildew additive
 - g. UV stabilized
 - h. Heat resistance: 180 degrees continuous, 200 degrees intermittent
 - i. Cold crack rating: minus 4 degrees F
- 2. Upper Curtain: Double polished clear vinyl
 - a. Thickness: 20 mil
 - b. Finish: Super double polish
 - c. Hand: Soft - 2S
 - d. UV stabilized
 - e. Mildew additive
 - f. Cold crack rating: 0 degrees F
 - g. Tensile strength: ASTM D 882, MD-3100/CD-3000
 - h. Elongation: ASTM D 882, MD-200/CD-220
 - i. Tear strength: ASTM D 882, MD-385/CD-385
 - j. Heat shrinkage: ASTM D 882, MD-minus 6/CD-+2
 - k. Fire retardancy: NFPA 701

2.04 CURTAIN FABRICATION

A. Fabricate curtains to comply with the following requirements:

- 1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
- 2. Length: Equal to floor-to-ceiling height minus depth of track and carrier at top
- 3. Top, Bottom, and Side Hems: Manufacturer's standard
- 4. Vertical Seams: Manufacturer's standard.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install tracks level and plumb, according to manufacturer's written instructions.
 - 1. Curtain Track Mounting: As indicated on Drawings.
- B. Surface Track Mounting: Fasten surface-mounted tracks at intervals of not less than 24 inches. Fasten support at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
 - 1. Mechanically fasten directly to bottom of concrete deck with anchor screws.
- C. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
- D. Curtain Carriers: Provide curtain carriers adequate for manufacturer's recommended spacing along the full length of the curtain plus an additional carrier.
- E. Curtains: Hang curtains on each curtain track.

3.02 PROTECTION

- A. Protect installed recessed track openings with nonresidue adhesive tape to prevent debris from ceiling finishing operations from impeding carrier operation.

END OF SECTION 10195

SECTION 10440

INTERIOR BUILDING SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Unframed panel signs, with embossed face, for interior applications.
 - 2. Signage accessories.
 - 3. Signage Schedule.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for temporary project identification signs.
 - 2. Division 15 Sections for labels, tags, and nameplates for mechanical equipment.
 - 3. Division 16 Sections including for labels, tags, and nameplates for electrical equipment.
 - 4. Division 16 Section "Interior Lighting" for illuminated exit signs.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign, including large-scale details of wording, lettering, artwork, and braille layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
 - 1. Panel Signs: Full-size Samples of each type of sign required.
 - 2. Approved samples will not be returned for installation into Project.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by signage manufacturer.
- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements For Accessibility: In addition to requirements of authorities having jurisdiction, provide installed signage that complies with the more restrictive of U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and CalDAG 2000 California Disabled Accessibility Guidebook.
 - 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to signage indicated on Schedule at end of Part 3.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.
- D. Handle products in accordance with manufacturer's instructions.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with the requirements provide ASI Sign Systems; ASI EmBoss ADA Ready Sign System or a comparable product of one of, but not limited to, the following:
 - 1. Innerface Sign Systems, Inc.
 - 2. Mohawk Sign Systems.
 - 3. Signature Signs, Inc.
 - 4. Supersine Company (The).

2.02 PANEL SIGN MATERIALS

- A. Mounting Panel: Acrylic.

- B. Face: Vacuum formed 1.5 mil, clear, scratch resistant PVC/vinyl acetate bonded to acrylic mounting panel.

2.03 FABRICATION, GENERAL

- A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.
- C. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
- D. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
- E. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
- F. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
- G. Graphic Content and Style: Provide sign copy that complies with requirements indicated in the Signage Schedule and on Drawings for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.

2.04 FABRICATION

- A. Tactile Graphics and Text:
 - 1. Fabrication process: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer's vacuum formed embossing process.
 - 2. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.
- B. Mounting Panel: 0.080 inch thick minimum, matte finished acrylic.
- C. Background Appearance: Solid colors as select by Architect from manufacturer's standard range.
- D. Tactile Lettering and Graphics Color: As selected by Architect from 3M standard vinyl colors.
- E. Overall Panel Size: See Signage Schedule at end of Section.
- F. Shape: See Signage Schedule at end of Section.

- G. Letter Style, Colors, Letter Sizes and Layout Position: See Signage Schedule at end of Section and ,if not indicated, as selected by Architect from manufacturer's standard letter styles and color charts.
- H. Text schedule: See Signage Schedule at end of Section.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items provided under other sections of Work are sized and located to accommodate signs.
- C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Install product at heights to comply with Part 1 Article "Quality Assurance."
- C. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using one of following methods approved by Architect:
 - 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Hook-and-Loop Tapes: Use hook-and-loop tapes to mount signs to smooth, nonporous surfaces.
 - 3. Magnetic Tape: Use magnetic tape to mount signs to smooth, nonporous surfaces.
 - 4. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.

5. Shim Plate Mounting:

- a. Application: For mounting to irregular and rough surfaces.
- b. Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.

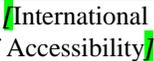
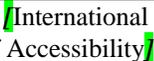
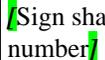
6. Where panel signs are mounted on glass, provide matching plate on opposite side of glass to conceal mounting materials.

3.03 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

(See Sign Schedule next page)

3.04 SIGN SCHEDULE

Sign Type/Location	Location/Mounting	Message	Size	Letters/Braille	Color	Remarks
Building Entrance	Approximately 5 feet above entrance landing immediately adjacent to door on strike side; in a position that is readily visible when the door is in either the open or closed position.	Pictogram 	6- by 6-inch minimum	6- by 6-inch Pictogram	Pictogram on contrasting background	Comply with CalDAG Chapter 7, Articles 23 and 58.
Toilet Rooms Doors	On door, centered 60-inch from the floor.	Pictogram  with either of the following placed directly below: MEN'S TOILET ROOM or WOMEN'S TOILET ROOM or UNISEX TOILET ROOM	Men's: Equilateral triangle 1/4-inches thick with edges 12-inches long and vertex pointing upward. Women's: 12-inch diameter circle 1/4-inch thick. Unisex: 12-inch diameter circle 1/4-inch thick with 1/4-inch triangle superimposed within circle.	Pictogram and letters sized to fit.	Pictogram and letters on contrasting background	Comply with CalDAG Chapter 7, Articles 42 and 58.
Permanent Rooms and Spaces	Centered 60-inches from the floor, on wall adjacent to door on strike side.	 Sign shall identify room number 	No less than 18 square inches area.	5/8-inch minimum, 2-inches maximum height, Arabic (sans serif block) letters and numerals with corresponding Grade II Braille	Letters on contrasting background	Comply with CalDAG Chapter 7, Article 58.
Exit Doors using key locking hardware in lieu of exit devices.	Mount on locking side of door.	THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC
Fire Doors, one-hour fire protection rating or greater	Mount on both sides of door.	FIRE DOOR - KEEP CLOSED - DO NOT OBSTRUCT		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC

Sign Type/Location	Location/Mounting	Message	Size	Letters/Braille	Color	Remarks
Stairway Identification	Approximately 5 feet above floor landing immediately adjacent to door on strike side; in a position that is readily visible when the door is in either the open or closed position.	signs shall identify the stairway location, indicate whether or not there is roof access, the floor level, and the upper and lower terminus of the stairway	12- by 12-inches minimum	1-inch high minimum Arabic (sans serif block) letters and numerals with corresponding Grade II Braille	Letters on contrasting background	Comply with CalDAG Chapter 7, Articles 22 and 58; and UBC.
Emergency Shutoff Valves for flammable fuels	Mount at each shutoff valve	insert type of fuel SHUTOFF VALVE		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC
No Smoking (See Notes 2 & 3)	Mount at each door into space. Provide one additional sign for each 500 SF of floor area in space.	NO SMOKING		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC
Floor Loading	Mount at each floor level of freight elevator lobby	SQUARE FOOT LIVE LOADS FOR THIS FLOOR OR AREA SHALL NOT EXCEED insert design live load		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC
Room Capacity	Locate at any room used for assembly purpose. Mount at each exit doorway.	ROOM CAPACITY - insert number OCCUPANTS		1-inch high minimum block letters	Letters on contrasting background	Comply with UBC
<p>Notes:</p> <ol style="list-style-type: none"> Final message content, letter height, color and location shall be confirmed by Architect and Authorities having jurisdiction. Table indicates general requirements; see references cited for detailed requirements. Caution sign at areas containing or dispensing flammable gasses or liquids. Caution sign at storage areas. 						

END OF SECTION 10440

SECTION 10505
METAL LOCKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes single tier wardrobe lockers.
- B. Related Sections include the following:
 - 1. Division 6 Section "Miscellaneous Carpentry" for wood blocking and base.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of locker.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Show locker fillers, trim, base, sloping tops, and accessories. Include locker-numbering sequence.
- C. Samples for Verification: For metal lockers, in manufacturer's standard sizes.
- D. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain locker units and accessories through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for locker installation.
- B. Protect lockers from damage during delivery, handling, storage, and installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 366, matte finish, suitable for exposed applications, and stretcher leveled or roller leveled to stretcher-leveled flatness.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
- D. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on units anchored to concrete floors for corrosion resistance.

2.02 WARDROBE LOCKERS

- A. Basis of Design Manufacturer and Product: Subject to compliance with the requirements provide Penco Products, Inc.; Subsidiary of Vesper Corporation; Standard Guardian Lockers or a comparable product by one of the following:
 - 1. Art Metal Products.
 - 2. Debourgh Mfg. Co.
 - 3. List Industries, Inc.
 - 4. Republic Storage Systems Co.
 - 5. Tenssco.
 - 6. Hadrian Locker.
- B. Size: Each single tier locker unit shall measure depth and width indicated on Drawings by 72 inches high, for mounting on base structure.
- C. Body: Form backs, tops, bottoms, sides, and intermediate partitions from steel sheet; flanged for double thickness at back vertical corners. Comply with the following:
 - 1. Back-Material Sheet Thickness: 0.0239 inch (24 gage).
 - 2. Side-Material Sheet Thickness: 0.0239 inch.
 - 3. Exposed Ends: Form exposed ends of nonrecessed lockers from minimum 0.0598-inch- thick (16 gage) steel sheet.
- D. Frames: Form channel frames from minimum 0.0598-inch- thick steel sheet; lapped and welded at corners. Form continuous integral door strike on vertical frame members. Provide resilient bumpers to cushion door closing.
 - 1. Latch Hooks: Form from minimum 0.1046-inch- thick steel; welded or riveted to door frames.
 - 2. Cross Frames: Form intermediate channel cross frames between tiers from minimum 0.0598-inch- thick steel sheet. Weld to vertical frame members.
- E. Doors: One-piece steel sheet, formed into channel shape at vertical edges and flanged at right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees. Comply with the following:

1. Sheet Thickness: 0.0598 inch (16 gage) minimum.
 2. Reinforcing and Sound-Dampening Panels: Brace or reinforce inner face of doors with manufacturer's standard reinforcing angles, channels, or stiffener panels.
 3. Acoustical Treatment: Fabricate lockers for quiet operation with manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact.
 4. Louvered Vents: Stamped, louvered vents in door face, as follows:
- F. Hinges: Steel, full loop, five or seven knuckle; tight pin; minimum 2 inches high. Weld to inside of door frame and attach to door with at least two factory-installed fasteners that are completely concealed and tamper resistant when door is closed.
1. Provide at least three hinges for each door.
- G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking.
 2. Latch Hooks: Equip doors with 3 latch hooks; fabricated from minimum 0.0966-inch-thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 3. Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- H. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.
1. Bolt Operation: Automatically locking spring bolt.

2.03 LOCKER ACCESSORIES

- A. Interior Equipment: Furnish each locker with the following items, unless otherwise indicated:
1. Hooks and Shelves: Provide not fewer than the following number of single-prong hooks, manufacturer's standard zinc-plated, ball-pointed steel. Attach hooks with at least two fasteners.
 - a. Single-Tier Units: Shelf, one double-prong ceiling hook, and three single-prong wall hooks.
- B. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 3/8 inch high. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
1. Number lockers in the following sequence: The first number shall begin on the left-most upper locker in the room, the second number shall be on the locker

beneath it, the third number shall be on the next upper locker to the right, the fourth on the next lower locker on the right and so on. The last number shall be on the lower right locker in the room.

- C. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch- thick steel sheet in an unequal leg angle shape, and finished to match lockers. Provide slip joint filler angle formed to receive filler panel.
- D. Boxed End Panels: Manufacturer's standard; fabricated from minimum 0.0598-inch-thick steel sheet, with 1-inch- wide edge dimension, finished to match lockers, and designed for concealing exposed ends of nonrecessed lockers.
- E. Continuous Sloping: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch thick.
 - 1. Closures: Vertical end type

2.04 FABRICATION

- A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.
- B. Knocked-Down Construction: Fabricate lockers for nominal assembly at Project site.
- C. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.
 - 1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.
- D. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.

2.05 FINISHES, GENERAL

- A. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.
- B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.06 STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils on doors, frames, and legs, and 1.1 mils elsewhere.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full line of paint colors:

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install metal lockers and accessories level, plumb, rigid, and flush according to manufacturer's written instructions.
- B. Assemble knocked-down lockers with standard fasteners, with no exposed fasteners on door faces and face frames.
- C. Anchor lockers to base and walls at intervals recommended by manufacturer, but not more than 36 inches o.c. Install anchors through backup reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.
- D. Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed lockers with concealed clips.
 - 2. Attach sloping top units to lockers, with closures at exposed ends.
- E. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed lockers.

3.02 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
- B. Clean interior and exposed exterior surfaces and polish nonferrous-metal surfaces.
- C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.
- D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10505

SECTION 10520

FIRE EXTINGUISHERS AND BRACKETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following where FEB is designated on the Drawings:
 - 1. Portable fire extinguishers.
 - 2. Mounting brackets for fire extinguishers.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles.
 - 1. Fire Extinguishers: Include rating and classification.
- B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and brackets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PORTABLE FIRE EXTINGUISHERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. JL Industries, Inc.
 - 2. Larsen's Manufacturing Company.
 - 3. Potter Roemer; Div. of Smith Industries, Inc.
 - 4. Watrous; Div. of American Specialties, Inc.
- B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Valves: Manufacturer's standard.
 - 2. Handles and Levers: Manufacturer's standard.
 - 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- C. Multipurpose Dry-Chemical Type: UL-rated, 20-A:120-B:C, 20-lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.02 MOUNTING BRACKETS

- A. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include, but are not limited to the following:
 - 1. JL Industries, Inc.; Bracket.
 - 2. Larsen's Manufacturing Company; Bracket #846.
 - 3. Potter Roemer; Div. of Smith Industries, Inc.; Bracket #3904
- B. Mounting Brackets: Manufacturer's galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 1. Bracket shall have top and bottom spring steel latching straps.
 - 2. Color: Red.
- C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights indicated below.
 - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- C. Identification: Apply decals at locations indicated.

END OF SECTION 10520

SECTION 10605

CHAIN-LINK PARTITIONS AND GATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following items fabricated from galvanized-steel chain link fencing fabric and framework:
 - 1. Interior partitions.
 - 2. Gates: Swing.
- B. Related Sections include the following:
 - 1. Division 2 Section "Chain Link Fences" for site fencing.
 - 2. Division 5 Section "Metal Fabrications" for overhead bracing assembly.

1.03 DEFINITIONS

- A. Terms below shall be as defined in ASTM E 2016:
 - 1. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
 - 2. Lock Crimp: Deep crimps at points of intersection that lock wires securely in place.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link partitions and gates.
 - 1. Partition and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
 - 3. Gates and hardware.
- B. Shop Drawings: Show locations of partitions, gates, posts, rails, details of extended posts, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.
- C. Qualification Data: For Installer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link partitions and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Single-Source Responsibility: Obtain chain link partition, including accessories, fittings, and fastenings, from a single source.
- C. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver chain link items palleted or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of construction contiguous with chain link items by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish location dimensions and proceed with fabricating chain link items without field measurements. Coordinate wall, floor and ceiling construction to ensure that actual location dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 CHAIN-LINK PARTITION FABRIC

- A. General: Height indicated on Drawings. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvaige knuckle or twist. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:
 - 1. Steel Wire Fabric: Metallic-coated wire with a diameter of 0.120 inches.
 - a. Mesh Size: 2 inches.
 - b. Coating Weight: Either of following at Contractor's option:
 - 1) Aluminum Coating: ASTM A 491, Type I, minimum 0.30 oz./sq. ft.
 - 2) Metallic (Zinc) Coating: ASTM A 392, Type II, Class 1, 1.2 oz./sq. ft. with zinc coating applied before weaving.
 - 3) Zn-5-Al-MM Aluminum-Mischmetal Alloy Coating: ASTM F 1345, Type III, Class 1, 0.60 oz./sq. ft.
 - 2. Selvaige: Twisted top and knuckled bottom.

2.02 PARTITION AND GATE FRAMING

- A. Posts and Rails: Round cold-formed, electric-resistance-welded, steel pipe or tubing, with minimum yield strength of 45,000 psi and with outside dimension, minimum wall thickness, and weight complying with ASTM F 761 or ASTM F 654.
 - 1. Partition Height: As indicated on Drawings.
 - 2. Tube or Pipe Diameter and Thickness: According to ASTM F 761.
 - a. Top Rail: 1.315 inches
 - b. Line Post: 1.66 inches.
 - c. Terminal Post: 1.90 inches.
 - d. Gate Post: 1.90 inches.
 - e. Tube or Pipe Thickness: 0.065 inch minimum.
- B. Gate: Comply with ASTM F 654 and the following:
 - 1. Type: I, single swing steel frame tubing.
 - 2. Fabric Height: 2 inches less than adjacent partition height.
 - 3. Leaf Width: As indicated on Drawings
- C. Hardware: Latches permitting operation from both sides of gate, hinges. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
- D. Metallic-Coated Steel: Posts, rails, and frames protected with an external coating of not less than 0.6 oz. of zinc/sq. ft., a chromate conversion coating, and a clear, verifiable polymer film; with an internal protective coating of not less than 0.6 oz. of zinc/sq. ft. or 81 percent, not less than 0.3-mil- thick, zinc pigmented coating.

2.03 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post and Line Caps: Provide for each post.
- C. Floor Shoes: Steel or cast iron, 2 inches high sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
- D. Ceiling Shoes: Steel or cast iron, minimum 4 inches long and sized to suit vertical framing, drilled for attachment to overhead structure, and fabricated to allow 2-inch minimum slip joint for deflection of overhead structure.
- E. Rail and Brace Ends: Steel or cast iron for attaching rails securely to each gate, corner, pull, and end post.
- F. Rail Clamps: Provide line and corner boulevard clamps for connecting top, intermediate and bottom rails in the partition line-to-line posts.
- G. Tension and Brace Bands: Pressed steel.
- H. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

- I. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- J. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch-diameter wire; galvanized coating thickness matching coating thickness of chain-link partition fabric.
- K. Finish for Pressed Steel or Cast Iron: Metallic coating not less than 1.2 oz./sq. ft. zinc.

2.04 ANCHORS

- A. Postinstalled Expansion Anchors: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
 - 2. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
 - 3. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.
- B. For Ceiling Shoes: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5.
 - 1. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563.
 - 2. Lock Washers: Helical, spring type, carbon steel, The American Society of Mechanical Engineers (ASME) ASME B18.21.1.
- C. For Floor Shoe: Provide expansion anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.05 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine floors for suitable conditions where chain link items will be installed.
- C. Examine walls and ceilings to which chain link items will be attached for properly located solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
- B. Setting Posts: Anchor partition posts continuous from floor deck to structure above unless indicated otherwise on Drawings. Provide top shoe allowing for a minimum of 2-inches of deflection.
- C. Frame around all abutting structure and finished surfaces to provide no greater than 2 inches clearance.

3.03 CHAIN-LINK PARTITION INSTALLATION

- A. Chain link Partitions:
 - 1. Anchor chain link partitions to floor with 3/8 inch diameter, postinstalled expansion anchors through floor shoes located at each post and corner. Adjust chain link partition posts in floor shoes to achieve level and plumb installation.
 - 2. Anchor chain link partitions to structure above with top shoe allowing for a minimum of 2-inches deflection of overhead structure.
 - 3. Anchor chain link partitions to walls at 12 inches o.c. using wall support angle or clip as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - 4. Install doors complete with door hardware.
 - 5. Weld metal bases to chain link partitions.
 - 6. Bolt accessories to chain link partition framing.
- B. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- C. Line Posts:
 - 1. Space line posts between terminal posts uniformly at 4 feet o.c. maximum.
 - 2. Provide line posts on each side of swinging door openings.

- D. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.
 - 1. Locate horizontal braces at same height as intermediate rails. Install so posts are plumb when diagonal rod is under proper tension.
- E. Top, Intermediate and Bottom Rails: Install, spanning between posts.
 - 1. Locate horizontal rails at 56 to 60 inches above finished floor.
- F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish floor surface and bottom selvage. Pull fabric taut and tie to posts and rails. Anchor to framework so fabric remains under tension after pulling force is released.
- G. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- H. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- I. Fasteners: Install nuts for tension bands and carriage bolts on the side of the partition opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.04 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.05 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas; repair galvanizing to comply with ASTM A 780.

END OF SECTION 10605

SECTION 10670

STORAGE EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:

1. 1106 Cabinet, 5 drawer, 33", underbench (Ref. Part 2.01)
2. 1140 Cabinet, flammable materials, large (Ref. Part 2.02)
3. 1185 Cabinet, storage, shop (Ref. Part 2.03)
4. 1210 Chair, shop (Ref. Part 2.04)
5. 1455 Rack, bulk storage (Ref. Part 2.05)
6. 1460 Rack, bulk storage, 8' high, 5' wide (Ref. Part 2.06)
7. 1535 Rack, pallet, 8', with deck (Ref. Part 2.07)
8. 1641 Rack, tire, auto/light truck, 3 tier (Ref. Part 2.08)
9. 1688 Shelving unit, 18" (Ref. Part 2.09)

- B. Installation of equipment with labor, services, and incidentals necessary for complete and operational equipment installation.

- C. Utilities to be roughed in at location recommended by manufacturer.

1.03 QUALITY ASSURANCE

- A. Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.

1.04 SUBMITTALS

- A. Product Data:

1. Submit Product Data in accordance with Division 1 - General Requirements of these specifications.
2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.
3. Additional costs resulting from substitution of products other than those specified, including drawing changes and construction, will be at the expense of the contractor.

1.05 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.
- C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish. Defects shall not include damage due to neglect, misuse, or situations resulting from non-performance of a manufacturer's recommended preventive maintenance schedule.
- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.
- E. All parts shall be readily available locally in the United States.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.
- C. Provide equipment and material specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

PART 2 - PRODUCTS

2.01 CABINET, 5 DRAWER, 33 INCHES, UNDERBENCH

Equipment Identifier: 1106

A. Manufacturer's Reference:

- 1. Prime manufacturer: Specifications are based on equipment identified herein by

manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.

- a. Stanley Storage Systems, Allentown, PA (800) 523-9462
 - b. Model: SEP 1016-AL with accessories
2. Alternate manufacturers: Contingent *upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
- a. Lyon Metal Products, Inc., Aurora, IL (708) 892-8941
 - b. Equipto, Dallas, TX (214) 443-9800

B. Capacities/Dimensions:

1. Overall dimensions, nominal:
 - a. Width: 30 inches
 - b. Depth: 27-3/4 inches
 - c. Height: 33 inches
2. Quantity of drawers: 5
3. Drawer capacity: 400 pounds each (minimum)
4. Drawer dimensions:
 - a. Usable width: 25-1/8 inches
 - b. Usable depth: 25-1/8 inches
 - c. Drawer usable height (drawers numbered top to bottom):
 - 1) Drawers 1 and 2: 3 inches
 - 2) Drawer 3: 3-7/8 inches
 - 3) Drawer 4: 6-1/4 inches
 - 4) Drawer 5: 7 inches

C. Features/Performance/Construction:

1. Cabinet shall be heavy gauge channel formed sheet steel with mountings permitting installation of various height drawers, front columns with drilled and tapped bolt holes.
2. Base design shall include front and rear forklift openings of ample strength to permit moving of fully loaded cabinet. Front base plate shall be provided. Base shall be drilled for bolting to the floor.
3. Drawer suspension shall be designed for total interchangeability for all drawer heights. Sealed steel roller bearing system shall permit full drawer extension at rated capacity without sagging.
4. Drawers and trays shall be fabricated of smooth sheet metal with partition and divider mounting hole grid punched on 3/4 inch centers. Drawer walls shall be slotted on 3/4 inch centers for mounting dividers and partitions.

5. Drawer pulls shall be nominal 3/4 drawer width with 1 inch high label holder provided with paper labels and protective vinyl shields and end caps.
6. Drawer dividers shall have a minimum of 12 divided sections.
7. Drawer heights shall be available in front heights of 3 to 12 inches in not over 1-1/2 inch increments.

D. Accessories:

1. Recessed base: Provide 3-inch high recessed base, Stanley Storage Systems Model No. RB-1, for each drawer unit (brings total height to 36 inches)
2. Overhead cabinet and accessories:
 - a. Overhead cabinet, Model No. 05245, one each per pair of drawer units
 - b. Shelving, Model No. CS40, two each per overhead cabinet

E. Finish: Phosphate primer covered by durable enamel in Owner's choice of manufacturer's standard colors

2.02 CABINET, FLAMMABLE MATERIALS, LARGE
Equipment Identifier: 1140

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Equipto, Addison, TX (214) 443-9800
 - b. Model: 1785
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
 - b. Justrite Manufacturing Co., Des Plaines, IL (847) 298-9250

B. Capacities/Dimensions:

1. Storage capacity: Up to 9 each, 5-gallon containers
2. Overall dimensions, nominal:
 - a. Width: 43 inches
 - b. Depth: 18 inches
 - c. Height: 65-5/8 inches
3. Shipping weight, nominal: 360 pounds

C. Features/Performance/Construction:

1. Cabinet shall comply with NFPA combustible liquids Code No. 30 and OSHA safety requirements.
2. Construction shall consist of double wall 18 gauge sheet steel with 1-1/2 inch air space between inner and outer walls.
3. Cabinet shall have a 2 inch pan-type bottom.
4. Two screened flame arrester vents per cabinet, 1 each at left side bottom and right side top, shall be threaded for and provided with 2 inch NPT steel plugs.
5. Leveling feet shall be provided at all four corners.
6. Electrical grounding attachments shall be provided on each side.
7. A spring-loaded fusible link with 160 degree F melting point shall actuate self closing double swinging doors mounted with full-length piano hinges. Doors shall be provided with three-point latch mechanism and key lock.
8. Two each adjustable shelves shall be provided between 5-3/8 inches from top and 7-5/16 inches from bottom on 1-5/8 inch centers.
9. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.

D. Finish: Durable enamel in safety sun yellow with "FLAMMABLE - KEEP FIRE AWAY" in minimum 4 inch bright red letters across doors

2.03 CABINET, STORAGE, SHOP

Equipment Identifier: 1185

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Equipto, Dallas, TX (214) 443-9800
 - b. Model: 1710
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
 - b. Republic Storage Systems, NE Canton, OH (216) 438-5800

B. Capacities/Dimensions:

1. Shelf capacity: 200 pounds per shelf (minimum)
2. Overall dimensions:
 - a. Width: 36 inches
 - b. Depth: 18 inches

c. Height: 78 inches

C. Features/Performance/Construction:

1. Four shelves, flanged, constructed of 14 gauge steel. Shelf adjustments on maximum 2 inch centers without removing fasteners.
2. Doors shall have a 3-point locking system with 3/8 inch-thick padlock hasp. Doors shall open a full 180 degrees and be flush mounted when closed with latching actuated cast steel handle.
3. Each door shall be hinged on three welded heavy-duty 1/4 inch diameter steel pin hinges.
4. Back, front, and sides shall be flush with no bolt heads on front or sides.
5. Locked by Owner-furnished padlock.
6. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.

D. Finish: Durable enamel in Owner's choice of manufacturer's standard colors

2.04 CHAIR, SHOP

Equipment Identifier: 1210

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
 - b. Model: 2083
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Safco Products Company, Minneapolis, MN (612) 536-6700
 - b. Global Industries Inc., Marlton, NJ (609) 596-3390

B. Capacities/Dimensions:

1. Seat:
 - a. Width: 16 inches
 - b. Depth: 15 inches
 - c. Thickness: 1-1/2 inches
 - d. Height adjustment: 22 to 32 inches with 10 inch height adjustment while seated

2. Backrest:
 - a. Width: 15 inches
 - b. Height: 9 inches
 - c. Height adjustment: 3 inches

3. Base:
 - a. Diameter: 25 inches
 - b. Number of legs: 5 each

C. Features and Construction:

1. Upholstery: The seat and back shall be constructed with self-skinning foam.
2. Ergonomic design: Stool shall be ergonomically designed with a waterfall front and a contoured back with tilt to promote good posture.
3. Single control: Stool shall have a single control for adjustment of the seat.
4. Base: Base of stool shall have five legs with a teardrop rest constructed of chrome.
5. Glides: Legs of stool shall have heavy duty glides for rough environments.

D. Finish: Metal components of stool shall be chrome and upholstery and dust cover shall be in manufacturer's standard colors.

2.05 RACK, BULK STORAGE
Equipment Identifier: 1455

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Equipto, Addison, TX (214) 443-9800
 - b. Model: 1028D62 with 9316 rack end and Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
 - b. Republic Storage Systems, Canton, OH (216) 438-5800

B. Capacities/Dimensions:

1. Beams:
 - a. Capacity: 2,630 pounds per pair of beams

- b. Dimensions:
 - 1) Length: 72 inches
 - 2) Width: 3-5/8 inches
 - 3) Depth: 2 inches overall front to back
- c. Number of beams per rack section: Eight total (four pairs)
- 2. Uprights:
 - a. Capacity: 10,000 pounds per upright
 - b. Dimensions:
 - 1) Width: 1-3/4 inches
 - 2) Depth, nominal: 24 inches
 - 3) Height: 96 inches
 - c. Number of uprights per rack section: Two minimum
- 3. Overall dimensions, nominal:
 - a. Length: 72 inches
 - b. Width: 24 inches
 - c. Height: 96 inches
- 4. Weight: 220 pounds
- C. Features/Performance/Construction:
 - 1. Beams:
 - a. Construction: Beams shall be “Z” shaped welded 14 gauge steel with heavy beam clips MIG-welded to beam ends.
 - b. Attachment: Beam clips shall have three beam hooks each for insertion into upright slots.
 - 2. Supports: Tie bars for each pair of beams shall fit into slots in beams. There shall be a minimum of two supports provided for each pair of beams.
 - 3. Uprights:
 - a. Construction: Upright posts shall be heavy duty 1-3/4 by 1-13/16 inch welded 14 gauge steel with tubular steel cross and diagonal members.
 - b. Adjustment: Upright posts shall have tapered slots on 1-1/2 inch centers for vertical beam adjustment.
 - c. Row ends: An extra upright frame shall be provided at end of each row to complete frame.

4. Decking:
 - a. Construction: Decking shall be 20 gauge rib shaped.
 - b. Capacity: Decking shall have a capacity of 2,778 pounds but load is limited to support capacity of beams and uprights.
5. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.

D. Accessories:

1. Anchoring foot: Equipto No. 7695L, two each per upright
2. Anchoring foot: Equipto No. 7695R, two each per upright

E. Finish: Durable enamel in Owner's choice of manufacturer's standard colors

2.06 RACK, BULK STORAGE, 8 FEET HIGH, 5 FEET WIDE

Equipment Identifier: 1460

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Equipto, Aurora, IL (214) 443-9800
 - b. Model: 1028 D525 with 9316 rack end and Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
 - b. Republic Storage Systems, NE Canton, OH (216) 438-5800

B. Capacities/Dimensions:

1. Beams:
 - a. Capacity: 2,763 pounds per pair of beams
 - b. Dimensions:
 - 1) Length: 60 inches
 - 2) Width: 3-1/2 inches
 - 3) Depth: 2 inches overall front to back
 - c. Number of beams per rack section: Eight total (four pairs)

2. Uprights:
 - a. Capacity: 1,550 pounds per section
 - b. Dimensions:
 - 1) Width: 1-3/4 inches
 - 2) Depth, nominal: 24 inches
 - 3) Height: 96 inches
 - c. Number of uprights per rack section: Two minimum
3. Overall dimensions, nominal:
 - a. Length: 60 inches
 - b. Width: 24 inches
 - c. Height: 96 inches

C. Features/Performance/Construction:

1. Beams:
 - a. Construction: Beams shall be “Z” shaped welded 14 gauge steel with heavy beam clips MIG-welded to beam ends.
 - b. Attachment: Beam clips shall have three beam hooks each for insertion into upright slots.
 - c. Supports: Tie bars for each pair of beams shall fit into slots in beams. There shall be a minimum of two supports provided for each pair of beams.
2. Uprights:
 - a. Construction: Upright posts shall be heavy duty 1-3/4 by 1-13/16 inch welded 14 gauge steel with tubular steel cross and diagonal members.
 - b. Adjustment: Upright posts shall have tapered slots on 1-1/2 inch centers for vertical beam adjustment.
 - c. Row ends: An extra upright frame shall be provided at end of each row to complete frame.
3. Decking:
 - a. Construction: Decking shall be 20 gauge rib shaped.
 - b. Capacity: Decking shall have a capacity of 2,778 pounds but load is limited to support capacity of beams and uprights.
4. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.

D. Accessories:

1. Anchoring foot: Equipto No. 7695L, two each per upright
2. Anchoring foot: Equipto No. 7695R, two each per upright

E. Finish: Durable enamel in Owner's choice of manufacturer's standard colors

2.07 RACK, PALLET, 8 FEET, WITH DECK

Equipment Identifier: 1535

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Lyon Metal Products, Aurora, IL (630) 892-8941
 - b. Model: N96 and end unit 36M96
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Interlake, Naperville, IL (800) INTERLAKE
 - b. Lista, Holliston, MA (508) 429-1350

B. Capacities and Dimensions:

1. Beams:
 - a. Minimum capacity: 6,850 pounds per pair of beams
 - b. Dimensions:
 - 1) Length: 96 inches
 - 2) Width: 4-9/20 inches
 - 3) Thickness: 2-3/4 inches
 - c. Installed beam height from finished floor:
 - 1) Top beams: 96 inches
 - 2) Second beams: 48 inches
 - 3) Third beams: 12 inches
 - 4) Verify beam heights with Owner prior to installation
2. Frames:
 - a. Capacity: 22,200 pounds per pair of frames (minimum)

- b. Dimensions:
 - 1) Thickness: 2-1/4 inches
 - 2) Depth: 36 inches
 - 3) Height: 96 inches
- 3. Overall dimensions, nominal:
 - a. Width: 100-1/2 inches
 - b. Depth: 36 inches
 - c. Height: 96 inches
- C. Features and Construction:
 - 1. Beams:
 - a. Construction: Beams shall be welded, step-type, heavy gauge steel box channel.
 - b. Attachment: High tensile studs, three each on each end shall engage tapered keyhole slots in uprights. Integral safety catch automatically snaps and locks into place when beam is properly seated.
 - 2. Frames:
 - a. Construction: Continuously MIG welded, heavy gauge steel box section uprights shall have deep channel cross and diagonal K-brace members.
 - b. Adjustment: Tapered keyhole slots on 2 inch centers shall be provided for vertical beam adjustments.
 - c. Base plate: Heavy gauge steel shall be LAP welded to upright with holes for anchoring to floor.
 - d. Row ends: An extra upright frame shall be provided to finish each row as indicated on equipment drawings.
 - 3. Decking: Continuously MIG welded, solid channel steel rib decking, including front to back supports.
 - 4. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.
- D. Finish: Durable enamel in Owner's choice of manufacturer's standard colors

2.08 RACK, TIRE, AUTO/LIGHT TRUCK, 3 TIER
Equipment Identifier: 1641

- A. Manufacturer's Reference:
 - 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.

- a. Equipto, Dallas, TX (214) 443-9800
 - b. Model: 806-52 starter
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lyon Metal Products, Aurora, IL (630) 892-8941
 - b. Jarke Corp., Niles, IL (847) 647-9633

B. Capacities/Dimensions:

1. Weight capacity: 1,208 pounds per pair of beams
2. Width: 60 inches
3. Depth: 15 inches
4. Height: 84 inches
5. Weight: 70 pounds

C. Features/Performance/Construction:

1. Beams shall be “Z” shaped welded 14 gauge steel with heavy beam clips MIG-welded to beam ends.
2. Beam clips shall have three beam hooks for insertion into upright slots.
3. Clearance and structure under rack shall allow for front and side fork entry and lifting.
4. Beams shall adjust on 1-1/2 inch centers.
5. Floor anchors shall be provided for each starting unit and subsequent add-on units as necessary.
6. Provide seismic bracing and anchorage to meet any local, state, and national codes and provisions.

D. Finish: Durable enamel in Owner’s choice of manufacturer’s standard colors

2.09 SHELVING UNIT, 18 INCHES

Equipment Identifier: 1688

A. Manufacturer’s Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer’s name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Equipto, Addison, TX (214) 443-9800
 - b. Model: 773-7S shelving unit with 773-7A add on and accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*

- a. Lyon Metal Products, Inc., Aurora, IL (630) 892-8941
- b. Stanley-Vidmar, Allentown, PA (610) 797-6600

B. Capacities/Dimensions:

1. Number of shelves: Eight
2. Shelf capacity: 1,000 pounds per shelf
3. Overall dimensions, nominal:
 - a. Width: 36 inches
 - b. Depth: 18 inches
 - c. Height: 84 inches
4. Installed height from finished floor, nominal:
 - a. Bottom shelf: 4-1/2 inches
 - b. Top shelf: 84 inches
 - c. Space remaining bottom 6 shelves evenly, approximately 12 inches center to center, and the top 2 shelves 10-1/2 inches center to center
5. Weight: 170 pounds

C. Features/Performance/Construction:

1. Shelf construction shall be double flange 18 gauge steel with box-formed edges on all four sides with front and rear shelf edge reinforced channels.
2. Uprights shall be double flanged uprights with tapered bracket slots punched on 1-1/2 inch centers for vertical shelf adjustment.
3. Shelf fastening shall consist of slip-in shelf brackets which reinforce and securely lock shelf into place in all four corners.
4. Units shall share common end panels with adjoining units. Back-to-back units shall be joined with common upright joints.
5. Provide seismic bracing and anchoring to meet any local, state, and national codes and provisions.

D. Accessories:

1. Additional shelf: Equipto No. 6231R, 1 each
2. Anchors: Floor, for seismic bracing, Equipto No. 190317A, 4 each

E. Finish: Durable enamel in owner's choice of manufacturer's standard colors

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items and specified accessories.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect or designated representative.
- B. Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb, and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
- C. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. After final installation is complete and prior to authorizing payment, specified equipment shall be checked with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing and installation debris from job site.
- D. Notify Architect or designated representative for acceptance inspection.

END OF SECTION 10670

SECTION 10801

TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following toilet and shower accessories:
 - 1. Combination Toilet-Seat-Cover Dispenser, Sanitary Napkin Disposal and Toilet Tissue Dispenser.
 - 2. Combination Toilet-Seat-Cover Dispenser and Toilet Tissue Dispenser.
 - 3. Sanitary napkin vendor.
 - 4. Soap dispensers.
 - 5. Combination Soap Dispenser and Shelf Unit
 - 6. Mirror units.
 - 7. Combination towel dispenser/waste receptacle.
 - 8. Robe hook.
 - 9. Grab bars.
 - 10. Underlavatory guard.
- B. Related Sections include the following:
 - 1. Division 9 Section "Gypsum Board Assemblies" for backing plate for grab bar installations on partition walls.

1.03 REFERENCES

- A. Accessibility Requirements: In addition to requirements of authorities having jurisdiction, provide installed accessories that comply with the more restrictive requirements of both "California Disabled Accessibility Guidebook 2000" (CalDAG 2000) and the Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath

Accessory Schedule and room designations indicated on Drawings in product schedule.

- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of American Disabilities Act Accessibility Guidelines for making facilities and accessories accessible to and usable by the physically handicapped.
- B. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- C. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
- D. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.
- E. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.06 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.07 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
 - 1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: Subject to compliance with requirements, provide accessories indicated in the Toilet and Bath Accessory Schedule at the end of Part 3 by Bobrick Washroom Equipment, Inc. or comparable products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. McKinney/Parker Washroom Accessories Corp.
 - 3. General Accessory Manufacturing Co. (GAMCO).

2.02 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60.
- D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- E. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
 - 1. Provide tempered glass where indicated.
- F. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- G. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.03 FABRICATION

- A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless steel hinge. Provide anchorage that is fully concealed when unit is closed.

- D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. One-piece, galvanized steel, wall-hanger device with spring- or screw-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 TOILET AND BATH ACCESSORY SCHEDULE

- A. Recessed Toilet-Seat-Cover Dispenser, Sanitary Napkin Disposal and Toilet Tissue Dispenser; Drawing Ref. No. 1: Where this designation is indicated, provide combination units complying with the following:
 - 1. Basis of Design Product: Bobrick; B-3574.
 - 2. General: Stainless-steel unit designed for nominal 4-inch wall depth with seamless wall flange; full length stainless steel piano hinged front door secured by tumbler lockset.

3. Seat-Cover Dispenser: Minimum 500 single- or half-fold paper seat-cover capacity.
 4. Sanitary Napkin Disposal Unit: Removable, reusable, molded, seamless plastic material receptacle, 0.8 gal minimum capacity. Self-closing disposal panel shall be secured to door with a spring-loaded, full-length stainless steel piano hinge and equipped with an international graphic symbol identifying napkin disposal.
 5. Toilet Tissue Dispenser: Double-roll dispenser, noncontrol delivery and manufacturer's standard plastic spindles designed for 4-1/2- or 5-inch- diameter-core tissue rolls. Spindles shall be removable only when door is open.
- B. Recessed Toilet-Seat-Cover Dispenser and Toilet Tissue Dispenser; Drawing Ref. No. 2: Where this designation is indicated, provide combination units complying with the following:
1. Basis of Design Product: Bobrick; B-3474.
 2. General: Stainless-steel unit designed for nominal 4-inch wall depth with seamless wall flange; full length stainless steel piano hinged front door secured by tumbler lockset.
 3. Seat-Cover Dispenser: Minimum 500 single- or half-fold paper seat-cover capacity.
 4. Toilet Tissue Dispenser: Double-roll dispenser, noncontrol delivery and manufacturer's standard plastic spindles designed for 4-1/2- or 5-inch- diameter-core tissue rolls. Spindles shall be removable only when door is open.
- C. Sanitary Napkin Vendor; Drawing Ref. No. 6: Where this designation is indicated, provide stainless-steel sanitary napkin vendor complying with the following:
1. Basis of Design Product: Bobrick B-3500 Series
 2. General: Fabricate cabinet of all-welded construction. Provide seamless door with returned edges and secured by tumbler lockset. Provide identification reading "Napkins" and "Tampons"; brand-name advertising is not allowed. Capacity not less than 30 napkins and 20 tampons.
 3. Mounting: Fully recessed type designed for nominal 4-inch wall depth.
 4. Operation: Single-coin operation, 25 cents.
- D. Soap Dispenser; Drawing Ref. No. 7: Where this designation is indicated, provide soap dispenser complying with the following:
1. Basis of Design Product: Bobrick B-8226.
 2. Liquid Soap Dispenser, Deck Mounted: Piston-and-spout-type unit with minimum 34-oz. capacity, polyethylene reservoir concealed below deck; brightly polished stainless-steel piston and 6-inch-nominal long spout; and chrome-plated deck escutcheon.
 - a. Mounting: Designed for mounting on vanity deck.
 - b. Soap Valve: Designed for dispensing soap in liquid form.
- E. Surface Mounted, Combination Soap Dispenser and Shelf Unit; Drawing Ref. No. 10: Where this designation is indicated, provide combination unit complying with the following:
1. Basis of Design Product: Bobrick B-2014.
 2. General: Stainless-steel unit designed for surface mounting with concealed anchorage. Shelf unit shall unlock from soap dispenser housing with special key

- (provide) and shall swing up to allow filling of soap vessel without removal from wall; stainless steel spring shall hold shelf up while filling.
3. Shelf: Nominal 18 inch long by 5 inch deep shelf fabricated of minimum nominal 0.05-inch- thick stainless steel, with exposed edges turned down not less than 1/2 inch.
 4. Liquid Soap Dispenser, Horizontal-Tank Type: Minimum 80 ounce capacity tank with molded internal plastic soap container, with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and with unbreakable window-type refill indicator.
 - a. Soap Valve: Designed for dispensing soap in liquid form.
- F. Mirror Units; Drawing Ref. 10: Where this designations is indicated, provide units complying with the following:
1. Basis of Design Product: Bobrick B-165 Series.
 2. Stainless Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.
 3. Size: As indicated on Drawings.
- G. Combination Towel Dispenser/Waste Receptacle; Drawing Ref. No. 4: Where this designation is indicated, provide stainless-steel combination unit complying with the following:
1. Basis of Design Product: Bobrick B-369.
 2. Recessed Type with Flush Receptacle: Designed for nominal 4-inch wall depth with continuous, seamless wall flange; towel dispenser in unit's upper compartment designed to dispense minimum of 350 C-fold or 475 multifold paper towels, in door with continuous hinge and knob latch; waste receptacle in unit's lower portion secured by friction catch and with minimum 2-gal. capacity.
- H. Robe Hook; Drawing Ref. No. 27: Where this designation is indicated, provide robe hook complying with the following:
1. Basis of Design Product: Bobrick B-6727.
 2. Double-Prong Unit: Stainless-steel, double-prong robe hook with rectangular wall bracket and backplate for concealed mounting.
- I. Grab Bars; Drawing Ref. No. 3 and 3A: Where these designations are indicated, provide stainless-steel grab bar complying with the following:
1. Basis of Design Product: Bobrick B-6806 Series.
 2. Type: Horizontal units.
 3. Size:
 - a. Grab Bar 34: 42-inches.
 - b. Grab Bar 35: 36-inches.
 4. Stainless-Steel Nominal Thickness: Minimum 0.05 inch.
 5. Mounting: Concealed with manufacturer's standard snap flanges and anchors.
 6. Gripping Surfaces: Smooth, satin finish.
 7. Outside Diameter: 1-1/2 inches for heavy-duty applications.

- J. Underlavatory Guard Ref. No. 21: Where this designation is indicated, provide underlavatory guard complying with the following:
1. Available products include the following: Truebro Inc.; Handi Lav-guard or equal.
 2. Insulating Piping Coverings: White, antimicrobial, molded-vinyl covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings.

END OF SECTION 10801

SECTION 11020

FIRE DEPARTMENT KEY BOX

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes recessed Fire Department key storage boxes (“knox box”).
- B. Products Supplied But Not Installed Under This Section:
 - 1. Install recessed mounting kit under Division 4 Section “Unit Masonry.”
- C. Related Sections: The following Sections contain requirements that may relate to this Section:
 - 1. Division 7 Section “Joint Sealants” for sealant applied to joint between key box and mounting substrate.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 COORDINATION

- A. Coordinate installation of anchorages and recessed mount for key storage box. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Key Storage Box: Locate boxes where indicated on Drawings and position as required by local Fire Department.

PART 2 - PRODUCTS

2.01 FIRE DEPARTMENT KEY STORAGE BOX

- A. General: Heavy-duty, UL Rated, high-security, factory finish metal box designed to store keys for Fire Department access.
- B. Basis of Design Product: Subject to compliance with the requirements provide Knox Company; Knox Box 3200 Series or comparable product by another manufacturer acceptable to Authorities Having Jurisdiction.
 - 1. Mounting: Recessed mounted.
 - 2. Size: Approximately 5-inches high by 4-inches wide by 3-1/4-inches deep.

3. Door Type: Hinged.
4. Color. Black.

2.02 ACCESSORIES

- A. Recessed Mounting Kit: Steel box assembly with integral box mounting bolts and masonry anchors, designed to recess storage box. Provide only kits supplied by manufacturer of storage box.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Recessed Mounting: Incorporate recessed mounting kit into masonry or concrete wall during wall construction. Install key box in recessed mount after walls are substantially completed and cleaned.
- B. Apply elastomeric sealant to top and side joints between key box and mounting substrate in accordance with requirements of Section 07920 Joint Sealants. Leave bottom joint open for drainage.

3.03 ADJUSTING AND CLEANING

- A. Confirm that box doors engage accurately and securely without forcing or binding.
- B. After completing installation of exposed, factory-finished boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 11020

SECTION 11132

FIXED PROJECTION SCREENS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes ceiling mounted, automatic, front-projection screens.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for steel rod and channel support structure.
 - 2. Division 16 Sections for electrical wiring, connections, and installation of remote-control switches for electrically operated projection screens.

1.03 SUBMITTALS

- A. Product Data: For each type of screen specified.
- B. Shop Drawings: Show layout and types of projection screens. Include the following:
 - 1. Location of screen centerline relative to ends of screen case.
 - 2. Location of wiring connections.
 - 3. Anchorage details.
 - 4. Frame details.
 - 5. Accessories.
- C. Wiring Diagrams: For electrically operated units.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain projection screens through one source from a single manufacturer. Obtain each screen as a complete unit, including necessary mounting hardware and accessories.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver projection screens until building is enclosed, other construction within spaces where screens will be installed is substantially complete, and installation of screens is ready to begin.

PART 2 - PRODUCTS

2.01 FRONT-PROJECTION SCREENS

- A. Material and Viewing Surface of Front-Projection Screens: Provide screens

manufactured from mildew- and flame-resistant fabric of type indicated for each type of screen specified and complying with the following requirements:

1. Matte-white viewing surface with gain characteristics complying with FS GG-S-00172D(1) for Type A screen surface.
2. Material: Vinyl-coated glass-fiber fabric.
3. Mildew Resistance: Provide mildew-resistant screen fabrics as determined by FS 191A/5760.
4. Fire-Test-Response Characteristics: Provide projection-screen fabrics identical to materials that have been tested for flame resistance according to both small- and large-scale tests of NFPA 701.
5. Seamless Construction: Provide screens in sizes indicated without seams.
6. Edge Treatment: Without black masking borders.
7. Size of Viewing Surface: As indicated in the following schedule:

Room #	Room Name	Screen Size (Nominal)
M208	Conference/Training Room	72 by 72 inches

B. Electrically Operated Screens, General: Provide manufacturer's standard UL-labeled units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Remotely control operation of each screen to comply with the following:

1. Single-Station Control: 3-position control switch with metal device box and cover plate for flush wall mounting and for connection to 120-V, ac power supply.
2. Motor: Provide motor in roller; instant-reversing motor of size and capacity recommended by screen manufacturer with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
3. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch- diameter, metal rod with ends of rod protected by plastic caps.
4. Roller for motor in roller supported by vibration- and noise-absorbing supports.

C. Electrically Operated Screens with Automatic Ceiling Closure: Units designed and fabricated for recessed installation in ceiling with bottom of case composed of 2 panels fully enclosing screen, motor, and wiring; 1 panel hinged and designed to open and close automatically when screen is lowered and fully raised, and the other panel removable or openable for access to interior of case; and complying with the following requirements:

1. Screen Case with Motor in Roller: Wood or medium-density-fiberboard sides and top with metal-lined wiring compartment and aluminum or medium-density-fiberboard bottom panels, factory primed and constructed as follows:
 - a. Offset mount bottom panels so their bottom surface will align flush with adjoining ceiling and the bottom edges of case sides and ends will be recessed behind ceiling finish.
 - b. Provide single or double top as standard with manufacturer.

D. Available Products: Subject to compliance with requirements, products that may be

incorporated into the Work include, but are not limited to, the following:

1. Matte-White Viewing Surfaces:
 - a. Da-Lite Screen Co., Inc.; Matte White.
 - b. Draper Shade & Screen Co., Inc.; Fiberglass Matte White.
2. Electrically Operated Screens with Ceiling Closure, Motor In Roller:
 - a. Da-Lite Screen Co., Inc.; Boardroom Electrol.
 - b. Draper Shade & Screen Co., Inc.; Envoy.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and relationship to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
 1. Test electrically operated units to verify that screen, controls, limit switches, closure, and other operating components are in optimum functioning condition.

3.02 PROTECTING AND CLEANING

- A. Protect projection screens after installation from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF SECTION 11132

SECTION 11140

VEHICLE SERVICE EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:

1. 2165 Compressor, air, receiver mounted, 25 HP duplex (Ref. Part 2.01)
2. 2231 Dryer, air, refrigerated, 250 CFM (Ref. Part 2.02)
3. 7250 Hose and dispenser (CG) (Ref. Part 2.03)
4. 7255 Hose and dispenser (GO) (Ref. Part 2.04)
5. 7510 Pump, air piston, (CG), with hoist (Ref. Part 2.05)
6. 7520 Pump, air piston, 10:1 ratio (ATF, EO1, EO2, EO3, GO) (Ref. Part 2.06)
7. 7530 Pump, diaphragm, mixing (EC) (Ref. Part 2.07)
8. 7540 Pump, diaphragm, waste fluid evacuation (WO) (Ref. Part 2.08)
9. 7541 Pump, diaphragm, waste fluid evacuation (WC) (Ref. Part 2.09)
10. 7700 Reel banks - general (Ref. Part 2.10)
11. 7720 Reel bank (CG, GO) (Ref. Part 2.11)
12. 7740 Reel bank (ATF, EC, EO1, EO2) (Ref. Part 2.12)
13. 7750 Reel bank (ATF, EC, EO1, EO2, EO3) (Ref. Part 2.13)
14. 7960 Tank, double wall, cube, 280 gallons (Ref. Part 2.14)
15. 7970 Tank, double wall, cube, 500 gallons (Ref. Part 2.15)
16. 7971 Tank, double wall, cube, slim, 500 gallons (WC) (Ref. Part 2.16)
17. 7972 Tank, double wall, cube, slim, 500 gallons (WO) (Ref. Part 2.17)
18. 7980 Tank, double wall, cube, 1,000 gallons (Ref. Part 2.18)
19. 7991 Tank, double wall, storage, 500 gallons (WO) (Ref. Part 2.19)
20. 7992 Tank, double wall, storage, 500 gallons (WC) (Ref. Part 2.20)
21. 7996 Drain pan, waste oil, rolling (Ref. Part 2.21)
22. 7997 Drain pan, waste coolant, rolling (Ref. Part 2.22)
23. 7998 Receiver, waste coolant, 25 gallons (Ref. Part 2.23)
24. 7999 Receiver, waste oil, 25 gallons (Ref. Part 2.24)

- B. Roughing-in installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Representative:

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out, and start up.
2. Training: Provide a qualified manufacturer's representative to provide training to Owner's maintenance personnel in operation and maintenance of specified equipment.

1.04 SUBMITTALS

A. Product Data:

1. Submit Product Data in accordance with Division 1 – General Requirements of these specifications.
2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

B. Operation and Maintenance Manual:

1. Provide complete parts, operating, and maintenance manual covering equipment at time of installation.
2. Description of system and components.
3. Schematic diagrams of electrical, plumbing and compressed air systems.
4. Manufacturer's printed operating instructions.
5. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
6. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
7. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Fold out diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1 – General Requirements.

C. Shop Drawings: Submit Shop Drawings in accordance with of Division 1 – General Requirements of these specifications.

1.05 PRODUCT SUBSTITUTIONS

A. Follow requirements specified in Division 1 - General Requirements.

B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.

C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish. Defects shall not include damage due to neglect, misuse, or situations resulting from non-performance of a manufacturer's recommended preventive maintenance schedule.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.
- C. Provide equipment and material specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.08 LABELING

- A. Manufacturer shall securely attach in a prominent location, on each major item of equipment, a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.
- B. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (UL) in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.
- C. Provide air receivers meeting requirements of ASME Code for Unfired Pressure Vessels and carry ASME approval stamp.

PART 2 - PRODUCTS

2.01 COMPRESSOR, AIR, RECEIVER MOUNTED, 25 HP DUPLEX Equipment Identifier: 2165

- A. Manufacturer's Reference:
 - 1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standard of quality, performance, features and construction.
 - a. Champion, Princeton, IL (815) 875-3321
 - b. Model: HR25D-25

2. Alternate manufacturers: Contingent upon compliance with these specification and documentation requirements set forth in SUBMITALS equipment produced by other manufacturers, including the following, *may* be considered as an equal.
 - a. Ingersol-Rand, Davidson, NC (704) 896-4000
 - b. Quincy, Quincy, IL (217) 222-7700
- B. General Description: Provide duplex compressor unit consisting of air-cooled motor compressors (25 HP), air receiver, after cooler, pressure reducing station, spring isolators and operating controls.
- C. Capacities/Dimensions:
1. Motors: 25 HP, two each
 2. Receiver: 250 gallons
 3. Rating: 175 PSIG
 4. Speed: 770 RPM
 5. Displacement: 218.8 CFM, 109.4 CFM each
 6. Delivery: 180.2 CFM, 90.1 CFM each
 7. Bore diameters: 6-1/4 and 3-1/4
 8. Stroke: 4 inches
 9. Number of cylinders: 4
 10. Output valve: 1-1/4 inches NPT (F)
 11. Overall dimensions:
 - a. Length: 90 inches
 - b. Width: 62 inches
 - c. Height: 76 inches
 12. Boltdown dimensions:
 - a. Length: 52-1/4 inches
 - b. Width: 48-1/4 inches
 13. Weight (approximate): 2,940 pounds
- D. Features/Performance/Construction:
1. Compressor construction:
 - a. Construct compressor unit with cast iron housing and head, heat treated forged steel or ductile iron shaft, aluminum alloy connection rods, aluminum pistons with lubricated carbon steel rings, high-strength alloy suction and discharge valves. Statically and dynamically balance rotating parts.
 - b. Mount motor and compressor on one-piece ribbed cast iron or welded steel base with provision for V-belt adjustment.

2. After cooler:
 - a. Provide air compressor with air after cooler suitable for operation under 135 PSIG working pressure.
 - b. Provide a belt guard style after cooler mounted on the compressor belt guard.
 - c. After cooler capacity to cool discharge air to within 25 degrees F of ambient air temperature with compressors operating at specified capacity.
3. Air receiver:
 - a. Provide vertical or horizontal receiver stamped ASME rated for working pressure of 200 PSI. Flange or screw inlet and outlet connections, welded steel construction.
 - b. Fittings to include adjustable pressure regulator, safety valve, pressure gauge, drain cock, and automatic pneumatic tank drain.
4. Pressure reducing valve:
 - a. Provide pressure reducing stations complete with automatic reducing valve and bypass, and low pressure side relief valve and gauge.
 - b. Compressor shall be provided with automatic start/stop capacity controls. In addition, provide centrifugal unloading to ensure for an unloaded compressor at start-up.
 - c. Valve capacity suitable to compressor reduce pressure from 50 PSI to 180 PSI. Pressure reducing valve to be adjustable upward from reduced pressure.
 - d. Provide valves with bronze or semi-steel bodies with stainless steel springs, stems, and seats.

E. Controls:

1. Pressure switch to cutout at 100 PSI with minimum differential of 20 PSI.
2. Provide electrical automatic alternation. In the event one compressor fails, another compressor automatically maintains air pressure.

F. Utility Requirements - Electric: 460 VAC, 3 phase, 50 HP

G. Finish: Durable enamel in manufacturer's standard color

2.02 DRYER, AIR, REFRIGERATED, 250 CFM
Equipment Identifier: 2231

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Champion, Princeton, IL (815) 875-3321

- b. Model: CRN-250
 - 2. Alternate manufacturers: *Contingent upon compliance with these specification and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.*
- B. Capacities/Dimensions:
- 1. Capacity:
 - a. 38 degrees F: 250 CFM
 - b. 50 degrees F: 315 CFM
 - 2. Overall dimensions:
 - a. Length: 32 inches
 - b. Depth: 32 inches
 - c. Height: 40 inches
 - 3. Drain connection: 1/4 inch FPT
 - 4. Air connection: 1-1/2 inch NPT
 - 5. Maximum working pressure: 250 PSIG
 - 6. Weight: 410 pounds
- C. Features/Performance/Construction:
- 1. Provide refrigerated air dryer of self-contained mechanical refrigeration type complete with heat exchanger, refrigeration compressor, automatic controls, moisture removal trap, internal wiring and piping, and full refrigerant charge.
 - 2. Provide air inlet and outlet connections at same level and factory insulated.
 - 3. Heat exchangers to consist of air-to-air and refrigerant-to-air coils. Provide centrifugal type moisture separator located at discharge of heat exchanger. Provide heat exchangers with automatic control system to bypass refrigeration system on low or no load condition.
 - 4. Refrigeration unit of hermetically sealed type to operate continuously to maintain specified 35 degrees F dew point. House unit in steel cabinet provided with access door and panel for maintenance and inspection.
 - 5. Provide dryer with air inlet temperature gauge, air inlet pressure gauge, ON/OFF switch, high temperature light, power on light and refrigerant gauge.
- D. Utility Requirements - Electrical: 460 VAC, 3 phase, 1-1/2 HP
- E. Finish: Durable enamel in manufacturer's standard color

2.03 HOSE AND DISPENSER (CG)

Equipment Identifier: 7250

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: 109165 (hose), 202600 (dispenser)
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Hose diameter: 3/8 inch ID
2. Material inlet: 1/4 inch NPT(M)
3. Material outlet: 1/4 inch NPT(M)
4. Maximum working pressure: 4,000 PSI
5. Hose length: 15 feet

C. Features/Performance/Construction:

1. Hose: Product hose shall be wire reinforced; 3/8 inch ID, and be pressure rated at 4,000 PSI minimum, Graco No. 109165
2. Delivery kit:
 - a. Control handle shall be high pressure type with 1/8 inch NPT(F) inlet and outlet, Graco No. 202600
 - b. Nozzle shall be curved and include hydraulic coupler, Graco No. 200389
 - c. Hardware: Assembly shall include a "Z" type swivel, Graco No. 202579
 - d. Connector/shut-off valve: Graco No. 202869
 - e. Mounting bracket for dispenser

D. Accessories: Hose rack, DJB Liberty Inc. No. 691 (909) 657-9300, one each

E. Utility Requirements: Provide process piping from product pumps to point of connection

2.04 HOSE AND DISPENSER (GO)

Equipment Identifier: 7255

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Incorporated, Minneapolis, MN (612) 623-6000
 - b. Model: 220592 (hose), 222413 (dispenser)
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Material inlet: 1/2 inch NPT(F)
2. Material outlet: 1/2 inch NPT(F)
3. Flow rate: 6 GPM minimum
4. Maximum working pressure: 3,000 PSI
5. Hose length: 16 feet

C. Features/Performance/Construction:

1. Hose: Product hose shall be wire reinforced; 1/2 inch ID, and be pressure rated at 3,000 PSI minimum (Graco No. 220592)
2. Dispense valve: Non metered type with built-in ball swivel (Graco No. 222413)
3. In line meter shall register increments of pints from 1 to 8, and have fluid inlet of 1/2 inch NPT(F) and outlet of 1/2 inch NPT(F) (Graco No. 244075)

D. Accessories: Hose rack, DJB Liberty Inc. No 691 (909) 657-9300, one each

E. Utility Requirements: Contractor shall provide process piping from product pumps to point of connection.

2.05 PUMP, AIR PISTON (CG), WITH HOIST

Equipment Identifier: 7510

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standard of quality, performance, features and construction.

- a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: 226-018
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITALS equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln. St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Products: Chassis grease (CG)
2. Maximum fluid pressure: 7,500 PSI
3. Air motor diameter: 4-1/4 inches
4. Operating range: 40-150 PSI
5. Maximum continuous duty flow rate: 4.4 pounds, minimum
6. Air consumption (approximate) at 1 GPM at 70 PSI: 19 CFM
7. Air inlet: 1/2 NPT(F)
8. Material outlet: 3/8 NPT(F)
9. Material inlet: Slotted

C. Accessories:

1. 1/2" air regulator: Graco No. 104266
2. Gauge: Graco No. 100960

D. Features/Performance/Construction:

1. Provide pneumatic operated piston pump operable with maximum air pressure of 150 PSI.
2. Provide with complete assembly, including combination air filter, regulator, pressure gauge, lubricator, air and product valves, and hose and fitting kit suitable for product.
3. Air motor shall be a non-corrosive design with no metal-to-metal contact compatible with product being delivered.
4. Provide base, inductor plate, elevator, and carriage support system for chassis grease pump with inductor plate.

E. Utility Requirements:

1. Air: 100 PSI, 3/4 inch line

2.06 PUMP, AIR PISTON 10:1 RATIO (ATF, EO1, EO2, EO3, GO)

Equipment Identifier: 7520

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standard of quality, performance, features and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: President 225-853
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln. St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Products: Automatic transmission fluid (ATF), engine oil (EO1, EO2, EO3), gear oil (GO)
2. Maximum fluid pressure: 1,800 PSI
3. Air motor diameter: 4-1/4 inches
4. Operating range: 40 to 180 PSI
5. Continuous duty flow rate: 3 to 4 GPM
6. Air consumption (approximate) at 100 PSI: 40 CFM
7. Air inlet: 1/2 NPT(F)
8. Material outlet: 3/4 NPT(F)
9. Material inlet: 1-1/2 NPT(F)

C. Features/Performance/Construction:

1. Provide pneumatic operated piston pump operable with maximum air pressure of 180 PSI.
2. Provide with complete assembly, including adapters for mounting on storage tanks, combination air filter, regulator, pressure gauge, lubricator, air and product valves, and hose and fitting kit suitable for product.
3. Air motor shall be a non-corrosive design with no metal-to-metal contact compatible with product being delivered.

D. Accessories:

1. One-half inch air regulator and pressure gauge: Graco No. 104266
2. Low level cut off: Graco No. 203688

- E. Utility Requirements: Air, 150 PSI, 40 CFM, 1/2 NPT(F); provide filter, regulator, and valves

2.07 PUMP, DIAPHRAGM, MIXING (EC)

Equipment Identifier: 7530

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish minimal acceptable standards of quality, performance, features and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: 236-265
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, St. Louis, MO (314) 679-4300

B. Capacities/Dimensions:

1. Products: Engine coolant (EC)
2. Pump ratio: 1:1
3. Maximum air pressure: 120 PSI
4. Free flow rate: 40 GPM
5. Air consumption (approximate): 40 CFM
6. Air inlet: 1/2 NPT(F)
7. Fluid outlet: 1 NPT(M)
8. Fluid inlet: 1 NPT(M)

C. Features/Performance/Construction:

1. Provide pneumatic operated diaphragm pump operable with maximum air pressure of 120 PSI.
2. Pump shall be provided in complete assembly, including the following accessories for mounting on adjacent wall:
 - a. Combination air filter
 - b. Regulator and gauge
 - c. Quick-connect coupler
 - d. Quick-connect nipple
 - e. Bleed-type air valve
 - f. Wall bracket
 - g. Thermal relief kit
 - h. Thermal relief valves

- i. Grounding wire and clamp
 - j. Suction hose kit
 - k. Flange adapter kit
 - l. Dual inlet manifold suitable for this product
3. Materials: Compatible with product being shelved.
 4. Pump shall handle oil, hydraulic oil, automatic transmission fluid, anti-freeze, windshield washer fluid, water, or fuel.

D. Accessories:

1. Thirty gallon water drum with a float valve
2. Dual inlet manifold, Graco No. 685984

E. Utility Requirements - Air: 120 PSI, 40 CFM, 1/2 NPT(F); provide filter, regulator, and valves

2.08 PUMP, DIAPHRAGM, WASTE FLUID EVACUATION (WO)

Equipment Identifier: 7540

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standards of quality, performance, features and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: Package No. 222090
2. Alternate manufacturers: *Contingent upon compliance with these specification and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank, Weaverville, NC (828) 645-4261
 - b. Lincoln, St. Louis, MO (314) 679-4300

B. Capacities/Dimensions:

1. Products: Waste oil
2. Pump ratio: 1:1
3. Maximum air pressure: 120 PSI
4. Maximum fluid outlet pressure: 100 PSI
5. Free flow rate: 40 GPM
6. Continuous duty delivery: 2.4 GPM
7. Air consumption (approximate): 40 CFM
8. Air inlet: 1/2 NPT(F)
9. Fluid outlet: 1 NPT(M)
10. Fluid inlet: 1 NPT(M)

C. Features/Performance/Construction:

1. Diaphragm pump shall provide 120 PSI air pressure for pump size and capacity as scheduled.
2. Pump shall be provided in complete assembly, including accessories for mounting on or adjacent to storage walls or tanks as scheduled, combination air filter, regulator, coupler, nipple, air valve wall bracket, relief kit, relief valves, wire and clamp, hose kit, adapter kit, and dual inlet manifold suitable for this product.
3. Materials: Compatible with product being shelved.
4. Pump shall handle oil, hydraulic oil, automatic transmission fluid, anti-freeze, windshield washer fluid, water, or fuel.
5. Pump shall have a tank monitoring system that shuts off the pump via solenoid valve when the waste fluid tank is full.
6. Monitoring system shall notify users with a strobe light and an audible alarm system.
7. Audible alarm shall be a minimum of 107 decibels.

D. Accessories:

1. Tank monitoring system power supply: Model No. TM1 SPS, BJ Enterprises (800) 457-0749, one each
2. Solenoid valve: Model No. TM1 SV, BJ Enterprises (800) 457-0749, one each
3. Strobe light: BJ Enterprises (800) 457-0749, one each
4. Solenoid valve and strobe light connected to waste tank high-level sensor.

E. Utility Requirements:

1. Electrical: 120 VAC, 20 A, standard grounded receptacle
2. Compressed air: 120 PSI, 40 CFM, 1/2 NPT(F), provide filter, regulator, and valves

2.09 PUMP, DIAPHRAGM, WASTE FLUID EVACUATION (WC)

Equipment Identifier: 7541

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standards of quality, performance, features and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: Package No. 222090
2. Alternate manufacturers: *Contingent upon compliance with these specification and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank, Weaverville, NC (828) 645-4261

b. Lincoln, St. Louis, MO (314) 679-4300

B. Capacities/Dimensions:

1. Products: Waste coolant
2. Pump ratio: 1:1
3. Maximum air pressure: 120 PSI
4. Maximum fluid outlet pressure: 100 PSI
5. Free flow rate: 40 GPM
6. Continuous duty delivery: 2.4 GPM
7. Air consumption (approximate): 40 CFM
8. Air inlet: 1/2 NPT(F)
9. Fluid outlet: 1 NPT(M)
10. Fluid inlet: 1 NPT(M)

C. Features/Performance/Construction:

1. Diaphragm pump shall provide 120 PSI air pressure for pump size and capacity as scheduled.
2. Pump shall be provided in complete assembly, including accessories for mounting on or adjacent to storage walls or tanks as scheduled, combination air filter, regulator, coupler, nipple, air valve wall bracket, relief kit, relief valves, wire and clamp, hose kit, adapter kit, and dual inlet manifold suitable for this product.
3. Materials: Compatible with product being shelved.
4. Pump shall handle oil, hydraulic oil, automatic transmission fluid, anti-freeze, windshield washer fluid, water, or fuel.
5. Pump shall have a tank monitoring system that shuts off the pump via solenoid valve when the waste fluid tank is full.
6. Monitoring system shall notify users with a strobe light and an audible alarm system.
7. Audible alarm shall be a minimum of 107 decibels.

D. Accessories:

1. Tank monitoring system power supply: Model No. TM1 SPS, BJ Enterprises (800) 457-0749, one each
2. Solenoid valve: Model No. TM1 SV, BJ Enterprises (800) 457-0749, one each
3. Strobe light: BJ Enterprises (800) 457-0749, one each
4. Solenoid valve and strobe light connected to waste tank high-level sensor.

E. Utility Requirements:

1. Electrical: 120 VAC, 20 A, standard grounded receptacle
2. Compressed air: 120 PSI, 40 CFM, 1/2 NPT(F), provide filter, regulator, and valves

2.10 REEL BANKS, GENERAL

Equipment Identifier: 7700

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified by manufacturer's name and model to establish acceptable standards of quality, performance, features and construction.
 - a. Graco, Inc., Minneapolis, MN (612) 623-6000
 - b. Model: 224384 (ATF), 224364 (CG), 224382 (EC), 224382 (EO1, EO2, EO3), 224380 (GO)
2. Alternate manufacturers: *Contingent upon compliance with these specification and documentation requirements set forth in SUBMITALS equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200
 - b. Balcrank Products, Inc., Weaverville, NC (828) 645-4261

B. Capacities/Dimensions:

1. Overall reel dimensions, nominal:
 - a. Width: 8-1/2 inches
 - b. Height: 21-1/6 inches
 - c. Reel diameter: 20 inches
2. Reel fluid inlet:
 - a. Air, water, and windshield washer solvent: 1/2 inch NPT(M)
 - b. Chassis grease: 3/8 inch NPT(M)
 - c. Other commodities: 1/2 inch NPT(M)
3. Hose:
 - a. Chassis grease:
 - 1) Length: 50 feet
 - 2) Inside diameter: 3/8 inch
 - 3) Working pressure: 4,000 PSI
 - b. Other commodities:
 - 1) Length: 50 feet
 - 2) Inside diameter: 1/2 inch
 - 3) Working pressure: 1,800 PSI

C. Features/Construction:

1. Construction: Frames, discs, and drum shall be fabricated of heavy gauge steel.
2. Double pedestal arm: Reel frame shall have double pedestal arms that are welded and gusseted.
3. Hose guide arm: Reel hose guide arm shall be adjustable with nylon rollers on all four sides of roller assembly at hose opening.
4. Ball stop: Adjustment of hose extension length shall be permitted by ball stop.
5. Rewind mechanism: Reel spring shall be enclosed and fastened to reel drum with a reinforcing clip.
6. Bearings and ratchet latch: Reel shall have permanently lubricated bearings and extra large ratchet latch with audible hose position lock.
7. Hose covers and tubes: Chassis grease hose shall have Buna-N tube and Buna-N PVC cover. All other commodity hoses shall have Buna N nitrile tube with nitrile PVC cover.
8. Delivery kits: Each commodity hose shall be fitted with the dispensing control as listed.
 - a. Automatic transmission fluid (ATF): Electronic in-line style english metered totalizing dispenser set to dispense in quarts to .01 increments, Graco No. 238461
 - b. Chassis grease (CG): High pressure control valve with knurled grip body, 1/4 inch, Graco No. 242056 with taper nose coupler and extension; "Z" swivel, Graco No. 202577
 - c. Engine coolant, mixed (EC): Electronic in-line style english metered totalizing dispenser set to dispense in pints to .01 increments, Graco No. 238461
 - d. Engine oil (EO1, EO2, EO3): Electronic in-line style english metered totalizing dispenser set to dispense in quarts to .01 increments, Graco No. 238461
 - e. Gear oil (GO): Electronic in-line style english metered totalizing dispenser set to dispense in pints to .01 increments, Graco No. 238461

D. Accessories:

1. Inlet hose kit: Each commodity reel shall be fitted with the inlet hose kit as listed.
2. Compressed air, water, and windshield washer solvent: 1/2 inch ID by 24 inch. medium pressure hose and fittings, rated for 2,000 PSI, Graco No. 218549, one each
3. Chassis grease: 3/8 inch ID by 24 inch, high pressure hose and fittings, rated for 4,000 PSI, Graco No. 218550, one each
4. Other commodities: 1/2 inch ID by 24 inch, medium pressure hose and fittings, rated for 2,000 PSI, Graco No. 218549, one each
5. Identification labels: Each commodity reel shall have a 3/4 by 4-1/4 inch metal identification label indicating the commodity, attached adjacent to each hose guide arm roller assembly. Label kits including label and mounting hardware as listed for each commodity. Note: Label is listed before ().

- a. Automatic transmission fluid (ATF): Graco No. 218673
- b. Grease (CG): Graco No. 218671
- c. Coolant (EC): Similar to Graco No. 218677
- d. Engine oil (EO1, EO2, EO3): Similar to Graco No. 218670
- e. Gear lube (GO): Graco No. 218672

E. Utility Requirements: Contractor shall provide process piping from product pumps to point of connection for each reel specified herein.

F. Finish: Durable enamel in manufacturer's standard color

2.11 REEL BANK (CG, GO)

Equipment Identifier: 7720

A. Reel bank shall consist of one each (CG) reel, and one each (GO) reel as delineated in part 2.10 REEL BANKS, GENERAL of this specification section.

2.12 REEL BANK (ATF, EC, EO1, EO2)

Equipment Identifier: 7740

A. Reel bank shall consist of one each (ATF) reel, one each (EC) reel, one each (EO1) reel, and one each (EO2) reel as delineated in part 2.10 REEL BANKS, GENERAL of this specification section.

2.13 REEL BANK (ATF, EC, EO1, EO2, EO3)

Equipment Identifier: 7750

A. Reel bank shall consist of one each (ATF) reel, one each (EC) reel, one each (EO1) reel, one each (EO2) reel, and one each (EO3) reel as delineated in part 2.10 REEL BANKS, GENERAL of this specification section.

2.14 TANK, DOUBLE WALL, CUBE, 280 GALLONS

Equipment Identifier: 7960

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC280DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Dynafab Corporation, Houston, TX (281) 590-5467

b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

1. Overall dimensions:
 - a. Length: 58 inches
 - b. Width: 34 inches
 - c. Height: 49 inches
2. Capacity: 280 gallons

C. Features/Performance/Construction:

1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 - for single wall tanks.
2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.
6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.
7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.

- d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)
 - b. Secondary: 4 inches NPT(M)

E. Finish: Durable enamel in manufacturer's standard color

2.15 TANK, DOUBLE WALL, CUBE, 500 GALLONS
Equipment Identifier: 7970

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC500DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Dynafab Corporation, Houston, TX (281) 590-5467
 - b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

1. Overall dimensions:
 - a. Length: 61 inches
 - b. Width: 46 inches
 - c. Height: 61 inches
2. Capacity: 500 gallons

C. Features/Performance/Construction:

1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 – for single wall tanks.
2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.
6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.
7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.
 - d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)

- b. Secondary: 6 inches NPT(M)
 - E. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle
 - F. Finish: Durable enamel in manufacturer's standard color
- 2.16 TANK, DOUBLE WALL, CUBE, SLIM, 500 GALLONS (WC)
Equipment Identifier: 7971
- A. Manufacturer's Reference:
 - 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC500DW
 - 2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Dynafab Corporation, Houston, TX (281) 590-5467
 - b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701
 - B. Capacities/Dimensions:
 - 1. Overall dimensions:
 - a. Length: 89-5/8 inches
 - b. Width: 30-1/4 inches
 - c. Height: 61 inches
 - 2. Capacity: 500 gallons
 - C. Features/Performance/Construction:
 - 1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 – for single wall tanks.
 - 2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
 - 3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
 - 4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.

5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.
6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.
7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.
 - d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)
 - b. Secondary: 6 inches NPT(M)
3. Waste coolant tank:
 - a. Tank monitoring system with high level detection and alarm siren: Model No. TM1 HLT, BJ Enterprises (800) 457-0749
 - b. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle

E. Finish: Durable enamel in manufacturer's standard color

2.17 TANK, DOUBLE WALL, CUBE, SLIM, 500 GALLONS (WO)

Equipment Identifier: 7972

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC500DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Dynafab Corporation, Houston, TX (281) 590-5467
 - b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

1. Overall dimensions:
 - a. Length: 89-5/8 inches
 - b. Width: 30-1/4 inches
 - c. Height: 61 inches
2. Capacity: 500 gallons

C. Features/Performance/Construction:

1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 – for single wall tanks.
2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.

6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.

7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.
 - d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.

8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)
 - b. Secondary: 6 inches NPT(M)

3. Waste oil tank:
 - a. Tank monitoring system with high level detection and alarm siren: Model No. TM1 HLT, BJ Enterprises (800) 457-0749
 - b. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle

E. Finish: Durable enamel in manufacturer's standard color

2.18 TANK, DOUBLE WALL, CUBE, 1,000 GALLONS

Equipment Identifier: 7980

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC1000DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Dynafab Corporation, Houston, TX (281) 590-5467
 - b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

1. Overall dimensions:
 - a. Length: 112 inches
 - b. Width: 48 inches
 - c. Height: 61 inches
2. Capacity: 1,000 gallons

C. Features/Performance/Construction:

1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 - for single wall tanks.
2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.

6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.

7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.
 - d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.

8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 6 inches NPT(M)
 - b. Secondary: 6 inches NPT(M)

E. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle

F. Finish: Durable enamel in manufacturer's standard color

2.19 TANK, DOUBLE WALL, STORAGE, 500 GALLONS (WO)
Equipment Identifier: 7991

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.

- a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC500DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Dynafab Corporation, Houston, TX (281) 590-5467
 - b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

1. Overall dimensions:
 - a. Length: 61 inches
 - b. Width: 46 inches
 - c. Height: 61 inches
2. Capacity: 500 gallons

C. Features/Performance/Construction:

1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 - for single wall tanks.
2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.
6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.

7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.
 - d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)
 - b. Secondary: 6 inches NPT(M)
3. Waste oil tank:
 - a. Tank monitoring system with high level detection and alarm siren: Model No. TM1 HLT, BJ Enterprises (800) 457-0749
 - b. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle

E. Finish: Durable enamel in manufacturer's standard color

2.20 TANK, DOUBLE WALL, STORAGE, 500 GALLONS (WC)
Equipment Identifier: 7992

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimum acceptable standards of quality, features, performance, and construction.
 - a. Containment Solutions, Conroe, TX (936) 756-7731
 - b. Model: LC500DW
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*

- a. Dynafab Corporation, Houston, TX (281) 590-5467
- b. Highland Tank & Mfg. Co., Stoystown, PA (814) 893-5701

B. Capacities/Dimensions:

- 1. Overall dimensions:
 - a. Length: 61 inches
 - b. Width: 46 inches
 - c. Height: 61 inches
- 2. Capacity: 500 gallons

C. Features/Performance/Construction:

- 1. Above ground used oil collection and fluid storage systems shall be constructed in accordance with national, state, and locally recognized *Above Ground Storage Tank* standards, including: Uniform Fire Code, Nation Fire Protection Association 30, 30A, and 31, Underwriters Laboratory Standard 142 – for single wall tanks.
- 2. The components of the system shall be assembled and tested at the factory and shall be covered under warranty.
- 3. The above ground double wall tank shall be designed and UL listed as an atmospheric tank with a maximum working pressure of one PSI.
- 4. The primary and secondary storage tanks shall have passed a proof of design hydrostatic pressure test of 25 PSI.
- 5. The above ground double wall tank shall be equipped with eight NPT openings including two for primary and secondary emergency venting as required by UL-142.
- 6. Primary tank enclosure:
 - a. Primary storage tank shall be rectangular in design and constructed with ASTM A-569 or A-36 carbon steel with continuous welds. Tank shall be equipped with lifting lugs.
 - b. Primary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
 - c. Tank enclosure shall be supported by two four-inch high steel support feet channels with internal anchoring holes to maintain ground clearance.
- 7. Secondary tank enclosure:
 - a. Secondary storage tank shall be a rectangular design constructed with ASTM A-569 or A-36 carbon steel with continuous welds and listed by Underwriters Laboratories as secondary containment.
 - b. Secondary enclosure shall provide a minimum of 110 percent secondary containment.
 - c. Secondary enclosure shall be equipped with a 2 inch monitoring port and a 4 or 6 or 8 inch emergency vent port as required by Underwriters Laboratories.

- d. Secondary storage tank shall be constructed and pressure tested (minimum 3 to 5 PSI) in accordance with UL-142 standards and carry the appropriate marking.
8. Installation of tank shall include seismic bracing and anchoring to meet all local, state, and federal codes and provisions.

D. Accessories:

1. Double float tank gauge that is calibrated by gallons or inches (Scully or equal)
2. Venting:
 - a. Primary: 4 inches NPT(M)
 - b. Secondary: 6 inches NPT(M)
3. Waste coolant tank:
 - a. Tank monitoring system with high level detection and alarm siren: Model No. TM1 HLT, BJ Enterprises (800) 457-0749
 - b. Electrical requirements: 120 VAC, 20 A, standard grounded receptacle

E. Finish: Durable enamel in manufacturer's standard color

2.21 DRAIN PAN, WASTE OIL, ROLLING

Equipment Identifier: 7996

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Incorporated, Minneapolis, MN (612) 623-6000
 - b. Model: 218-969 with Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Capacity: 30 gallons
2. Dimensions:
 - a. Length: 24 inches
 - b. Width: 33 inches

- c. Height: 11 inches
- 3. Wheels: 3 inches
- 4. Track width: 39 to 46 inches
- 5. Running width: 2-1/2 inches

C. Features/Performance/Construction:

- 1. Drain pan wheels shall be adjustable to fit pit opening width of 39 to 46 inches.
- 2. Wheels: Drain pan shall be equipped with four wheels, each having a 3 inch diameter minimum suitable for rolling in 4 by 2 inch steel channels recessed in inspection pit walls below the top edge of the finished shop floor.
- 3. Drain: The drain pan shall be equipped with 1/4 turn shut-off valve and dry break disconnect coupler with 6 feet of 1-1/2 inch suction hose for emptying pan.
- 4. Hose shall be hard plumbed to the waste coolant tank. Provide a wall mounted hook for storing hose/coupler assembly when not in use.
- 5. Unit shall be constructed of 12 gauge steel.
- 6. The unit shall contain anti-splash grill and baffles to provide for large drain area and prevent spills.
- 7. The unit shall include following as standard equipment:
 - a. 1-1/2 NPT drain valve
 - b. 1 1/2 NPT quick coupler
 - c. 1-1/2 NPT coupler cap

- D. Accessories: Six foot section of 1-1/2 inch suction hose with drain pan compatible dry break quick disconnect coupler on one end and a 1-1/2 inch NPT(F) hose fitting at the other end, one per drain pan

E. Finish:

- 1. Primed and finished in Owner's choice of manufacturer's standard enamel.
- 2. Provide "WASTE OIL" label in minimum 2 inch high painted red letters on both long sides of drain pan.

2.22 DRAIN PAN, WASTE COOLANT, ROLLING

Equipment Identifier: 7997

A. Manufacturer's Reference:

- 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Incorporated, Minneapolis, MN (612) 623-6000
 - b. Model: 218-969 with Accessories

2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Capacity: 30 gallons
2. Dimensions:
 - a. Length: 24 inches
 - b. Width: 33 inches
 - c. Height: 11 inches
3. Wheels: 3 inches
4. Track width: 39 to 46 inches
5. Running width: 2-1/2 inches

C. Features/Performance/Construction:

1. Drain pan wheels shall be adjustable to fit pit opening width of 39 to 46 inches.
2. Wheels: Drain pan shall be equipped with four wheels, each having a 3 inch diameter minimum suitable for rolling in 4 by 2 inch steel channels recessed in inspection pit walls below the top edge of the finished shop floor.
3. Drain: The drain pan shall be equipped with 1/4 turn shut-off valve and dry break disconnect coupler with 6 feet of 1-1/2 inch suction hose for emptying pan.
4. Hose shall be hard plumbed to the waste coolant tank. Provide a wall mounted hook for storing hose/coupler assembly when not in use.
5. Unit shall be constructed of 12 gauge steel.
6. The unit shall contain anti-splash grill and baffles to provide for large drain area and prevent spills.
7. The unit shall include following as standard equipment:
 - a. 1-1/2 NPT drain valve
 - b. 1 1/2 NPT quick coupler
 - c. 1-1/2 NPT coupler cap

D. Accessories: Six foot section of 1-1/2 inch suction hose with drain pan compatible dry break quick disconnect coupler on one end and a 1-1/2 inch NPT(F) hose fitting at the other end, one per drain pan

E. Finish:

1. Primed and finished in Owner's choice of manufacturer's standard enamel.
2. Provide "WASTE COOLANT" label in minimum 2 inch high painted red letters on both long sides of drain pan.

2.23 RECEIVER, WASTE COOLANT, 25 GALLONS

Equipment Identifier: 7998

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Incorporated, Minneapolis, MN (612) 623-6000
 - b. Model: 238-866 Series B, with Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. The Aro Corporation, Bryan, OH (419) 636-4242
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Capacity: 25 gallons
2. Dimensions:
 - a. Length: 24 inches
 - b. Width: 24 inches
 - c. Height: 45 to 72 inches
3. Dry weight: 54 pounds
4. Fluid inlet/inspection port size: 3 inch (76mm) buttress
5. Fluid outlet fitting size: 3/4 inch NPT
6. Collection funnel size: 22 by 24 inches

C. Features/Performance/Construction:

1. Unit shall be constructed of heavy duty, durable UV-stabilized polymer.
2. The unit shall include a gravity feed drain valve and a quick disconnect method of suction-evacuation from the top of the unit.
3. The unit shall be mounted on semi-pneumatic, synthetic rubber wheels and polyurethane front casters.
4. The unit shall contain a funnel assembly capable of extending to 72 inches.
5. The unit shall be dent, rust, and corrosion resistant.

D. Finish: UV-stabilized polymer complete with necessary markings to readily identify contents.

2.24 RECEIVER, WASTE OIL, 25 GALLONS

Equipment Identifier: 7999

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Graco, Incorporated, Minneapolis, MN (612) 623-6000
 - b. Model: 238-866 Series B, with Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Balcrank Products, Inc., Weaverville, NC (828) 645-4261
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Capacity: 25 gallons
2. Dimensions:
 - a. Length: 24 inches
 - b. Width: 24 inches
 - c. Height: 45 to 72 inches
3. Fluid inlet/inspection port size: 3 inch (76mm) buttress
4. Fluid outlet fitting size: 3/4 inch NPT
5. Collection funnel size: 22 by 24 inches

C. Features/Performance/Construction:

1. The unit shall be constructed of heavy duty, durable UV-stabilized polymer.
2. The unit shall include a gravity feed drain valve and a quick disconnect method of suction-evacuation from the top of the unit.
3. The unit shall be mounted on semi-pneumatic, synthetic rubber wheels and polyurethane front casters.
4. The unit shall contain a funnel assembly capable of extending to 72 inches.
5. The unit shall be dent, rust, and corrosion resistant.

D. Finish: UV-stabilized polymer complete with necessary markings to readily identify contents.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.
- B. Inspect equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items and specified accessories.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.
- B. Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb, and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as detailed or directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
 - 4. Fluid storage tanks:
 - a. Tank shall be seismically braced and anchored to meet all local, state, and federal codes and provisions.
 - b. Waste oil tank shall be vented to the outside of the building.
- C. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

- C. Clean area around equipment installation and remove packing and installation debris from job site.
- D. Notify Architect or designated representative for acceptance inspection.

3.05 TRAINING

- A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.
 - 1. 2165 Compressor, air, receiver mounted, 25 HP duplex; 2 hours
 - 2. 2231 Dryer, air, refrigerated, 250 CFM; 1 hour
 - 3. 7250 Hose and dispenser (CG); 1 hour
 - 4. 7255 Hose and dispenser (GO); 1 hour
 - 5. 7510 Pump, air piston, (CG), with hoist; 1 hour
 - 6. 7520 Pump, air piston, 10:1 ratio (ATF, EO1, EO2, EO3, GO); 1 hour
 - 7. 7530 Pump, diaphragm, mixing (EC); 1 hour
 - 8. 7540 Pump, diaphragm, waste fluid evacuation (WO); 1 hour
 - 9. 7541 Pump, diaphragm, waste fluid evacuation (WC); 1 hour
 - 10. 7700 Reel banks - general; 2 hours (minimum)
 - 11. 7720 Reel bank (CG, GO); 1/2 hour
 - 12. 7740 Reel bank (ATF, EC, EO1, EO2); 1/2 hour
 - 13. 7750 Reel bank (ATF, EC, EO1, EO2, EO3); 1/2 hour
 - 14. 7960 Tank, double wall, cube, 280 gallons; 1/2 hour
 - 15. 7970 Tank, double wall, cube, 500 gallons; 1/2 hour
 - 16. 7971 Tank, double wall, cube, slim, 500 gallons (WC); 1/2 hour
 - 17. 7972 Tank, double wall, cube, slim, 500 gallons (WO); 1/2 hour
 - 18. 7980 Tank, double wall, cube, 1,000 gallons; 1/2 hour
 - 19. 7991 Tank, double wall, storage, 500 gallons (WO); 1/2 hour
 - 20. 7992 Tank, double wall, storage, 500 gallons (WC); 1/2 hour
 - 21. 7996 Drain pan, waste oil, rolling; 1 hour
 - 22. 7997 Drain pan, waste coolant, rolling; 1 hour
 - 23. 7998 Receiver, waste coolant, 25 gallons; 1 hour
 - 24. 7999 Receiver, waste oil, 25 gallons; 1 hour
- B. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

END OF SECTION 11140

SECTION 11510
SHOP EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:
 - 1. 1805 Workbench, electronics, static dissipative (Ref. Part 2.01)
 - 2. 2045 Charger, battery, multiple, w/bus bar (Ref. Part 2.02)
 - 3. 2350 Lathe, brake, drum/shoe (Ref. Part 2.03)
 - 4. 2832 Vise, combination, swivel base, 5" (Ref. Part 2.04)
 - 5. 3140 Dust collector, lathe, brake (Ref. Part 2.05)
 - 6. 5558 Lift, man, scissors, pneumatic, self propelled (Ref Part 2.06)
 - 7. 7490 Press, oil filter (Ref. Part 2.07)
 - 8. 9520 Net, safety, pit, inspection, 40' (Ref. Part 2.08)
- B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.
- C. Piping, wiring, and switching between equipment and utilities.

1.03 QUALITY ASSURANCE

- A. Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.
- B. Manufacturer's Representative:
 - 1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out, and start up.
 - 2. Training: Provide technical representative to provide training to Owner's maintenance personnel in operation and maintenance of specified equipment.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Submit Product Data in accordance with Division 1 - General Requirements of these specifications.

2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

B. Operations and Maintenance Manual:

1. Provide complete parts, operating, and maintenance manual covering equipment at time of installation.
 - a. Description of system and components.
 - b. Schematic diagrams of electrical, plumbing and compressed air systems.
 - c. Manufacturer's printed operating instructions.
 - d. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
 - e. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Fold out diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1- General Requirements.

C. Shop Drawings: Submit Shop Drawings in accordance with of Division 1 - General Requirements of these specifications.

1.05 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.
- C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.

- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.
- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.
- E. All parts shall be readily available locally in the United States.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.
- C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.08 LABELING

- A. Manufacturer shall securely attach in a prominent location, on each major item of equipment, a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.
- B. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (UL) in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 - PRODUCTS

2.01 WORKBENCH, ELECTRONICS, STATIC DISSIPATIVE Equipment Identifier: 1805

- A. Manufacturer's Reference:
 - 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Equipto, Dallas, TX (214) 443-9800
 - b. Model: 388-5C with 464C5 instrument shelf
 - 2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Lyon Metal Products, Aurora, IL (630) 892-8941
 - b. Lista International Corporation, Holliston, MA (508) 429-1350

B. Capacities/Dimensions:

1. Overall dimensions, nominal:
 - a. Length: 60 inches
 - b. Depth: 34 inches
 - c. Height: 33-1/2 inches
2. Instrument shelf:
 - a. Depth: 12 inches
 - b. Length: 60 inches
 - c. Height: 14 inches
3. Workbench top:
 - a. Length: 60 inches
 - b. Depth: 34 inches
4. Weight:
 - a. Workbench: 141 pounds
 - b. Instrument shelf: 48 pounds

C. Features/Performance/Construction:

1. Work surface shall be industrial quality dissipative type with 10^6 to 10^9 OHMS per square inch resistivity and be constructed of 1-3/4 inch static dissipative plastic laminate with grounding kit. The top shall have a 180 degree full wrap laminate soft edge at the front.
2. Bench legs shall have leveling guides to level the bench.
3. Instrument shelf shall be constructed of 1-3/4 inch static dissipative plastic laminate with front 180 degree full wrap laminate soft edge and have 10^6 to 10^9 OHMS per square inch resistivity. Shelf top shall be supported by steel supports on each end. Each shelf support shall have UL Recognized electrical outlets. One instrument shelf shall be provided per bench.

D. Accessories:

1. Shelf assembly: Instrument, Equipto No. 464C5, one per bench

E. Utility Requirements: 120 VAC for power strip plug and 120 VAC for instrument shelf outlets

F. Finish: Table structure shall be durable enamel in Owner's choice of manufacturer's standard colors and the worktop shall be a static dissipative laminate

2.02 CHARGER, BATTERY, MULTIPLE, WITH BUS BAR

Equipment Identifier: 2045

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Associated Equipment Corporation, St. Louis, MO (314) 385-5178
 - b. Model: 6068 with Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Christie Automotive Products, Irvine, CA (714) 533-1003
 - b. Solar Division of Century Manufacturing Company, Minneapolis, MN (612) 884-3211

B. Capacities/Dimensions:

1. DC out rating: 15.5 VDC, 110 A.
2. Charging capacity: 1 to 36, 12 VDC batteries.
3. Charge rates: 16 rates, from 1 to 110 A.
4. Cabinet dimensions:
 - a. Height: 22 inches
 - b. Width: 15 inches
 - c. Depth: 11 inches
5. Shipping weight: 100 pounds with accessories

C. Features/Performance/Construction:

1. Cabinet: Unit shall be enclosed in bonderized steel cabinet with reinforced frame and gasketed access panel, suitable for permanent installation, including wall mounting.
2. Meters:
 - a. Voltmeter range: 11 to 17 VDC
 - b. Ammeter range: 0 to 110
3. Charging rate controls:
 - a. Manual: Fine and course four-position knobs shall permit 16 charging rates.
 - b. Automatic: Charge rate control shall automatically taper charge, permitting additional and removal of batteries without adjusting controls.

4. Input voltage: Multi-tap input shall be adjustable to match line voltages from 208 VAC, 1 ph, 13.8 A.
5. Transformers: Unit transformers shall be isolated and convection cooled.

D. Controls: Circuit breaker protection shall be integral with ON/OFF rocker switch.

E. Accessories: Bus bar set - Fiberglass backboard assembly shall be complete with connecting cables, insulated clamp storage bar, and 10 pair of 300 A rated charging leads, 36 inches long premounted at bus bar end with vinyl insulated safety clamps on other end, Associated No. 6075, quantity as required per drawings

F. Utility Requirements: 230 VAC, 1 phase, 15 A

G. Finish: Durable enamel in manufacturer's standard color

2.03 LATHE, BRAKE, DRUM/SHOE

Equipment Identifier: 2350

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Star Machine and Tool Co., Minneapolis, MN, (612) 378-3232
 - b. Model: 53-DS
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers *may* be considered as equal.

B. Capacities/Dimensions:

1. Drum spindle housing: Extends to 8 inches
2. Carriage feeds:
 - a. 0.003 inches/rev.
 - b. 0.005 inches/rev.
 - c. 0.010 inches/rev.
 - d. 0.018 inches/rev.
3. Drum arbor: 2-1/2 inch diameter
4. Brake block arbor: 1-3/4 inch diameter
5. Drum capacity range:
 - a. Diameter: 14 to 24 inches
 - b. Depth: 16 inches

6. Boring bar: 2-1/2 inch diameter
7. Motor:
 - a. Lathe: 3 HP, 460 VAC, 60 HZ, 3 ph
 - b. Chip collector: 1 HP
8. Spindle speeds: 20 to 90 RPM
9. Overall dimensions, less accessories:
 - a. Length: 54 inches
 - b. Width: 42 inches
 - c. Height: 42 inches
10. Chip collector:
 - a. Capacity: 12 gallons
 - b. 1 HP bypass motor
11. Shipping weight: 3,300 pounds

C. Features/Performance/Construction:

1. Brake lathe shall be designed to cut both drums with dual wheels attached, and oversized brake blocks, simultaneously.
2. Machine casting shall be one piece construction, with spindle housing, gear case housing and base, all incorporated in a single casting to assure rigidity and long service life.
3. Drum spindle housing shall be extended 8 inches to fully support the largest transit dual wheel assemblies without any outboard support and maintain drum accuracy and concentricity.
4. Lubrication system oil shall be pumped to spindle bearings with remainder of gear train operating in an oil bath.
5. Standard equipment:
 - a. Lathe assembly shall include all necessary tools and components (including boring bar assemblies, arbors, bar setting gauges, tool setting gauges, dial indicators, washers, bolts, wrenches, feed gears, spacers, silencers, cutting tools, radii cones, and fixtures) to properly turn brakes for transit buses currently operated by Owner or others which may be acquired by the time of beneficial occupancy of facility.
 - b. Portable chip collector, 12 gallon, diffused air exhaust system with a one horsepower by-pass motor, dual filter elements (moleskin primary filter and decron secondary filter) shall be provided.
 - c. Hood enclosure designed to completely encase the rotating shoe assembly during the lathe's operation without requiring any additional extending of the RH boring bar, shall be permanently mounted to the brake lathe.
6. Spindle bearings shall be tapered and adjustable.

7. Boring bar shall be permanently mounted to the brake lathe.
- D. Controls: Push-button ON/OFF safety control box shall be mounted on front of base. Standard magnetic starter shall have no voltage and three leg overload protection. Switching and other electrical controls shall meet applicable National Electrical Code requirements.
 - E. Utility Requirements - Electrical:
 1. Lathe motor: 460 VAC, 3 ph, 3 HP
 2. Chip collector: 1 HP
 - F. Finish shall be durable enamel in manufacturer's standard colors.
- 2.04 VISE, COMBINATION, SWIVEL BASE, 5 INCHES
Equipment Identifier: 2832
- A. Manufacturer's Reference:
 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Wilton Corporation, Palatine, IL (847) 934-6000
 - b. Model: 1755
 2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Ridge Tool Co., Elyria, OH (216) 323-5581
 - b. Milwaukee Tool and Equipment Co., Milwaukee, WI (414) 645-0200
 - B. Capacities/Dimensions:
 1. Jaw width: 5-1/2 inches
 2. Jaw opening: 5 inches
 3. Throat depth: 4 inches
 4. Overall dimensions, nominal:
 - a. Length: 21 inches
 - b. Width: 5-1/2 inches
 - c. Height: 12 inches
 5. Weight: 49 pounds
 6. Pipe capacity: 1/8 to 4-1/2 inches

C. Features/Performance/Construction:

1. Slide bar shall be machined steel and be oil port operable in machined channel.
2. Base shall swivel 360 degrees and have locking device.
3. Construction shall be semi-steel cast body and have hardened steel nut and screw.
4. Jaws shall have replaceable facings.

2.05 DUST COLLECTOR, LATHE, BRAKE

Equipment Identifier: 3140

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. The Transmatic Group, Inc. Wilmington, NC (910) 395-1808
 - b. Model: Dust Collector - DC11000, Pre Separator DCF 3500
 - c. Ductwork
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*

B. General Description: The dust collector unit shall utilize cyclone and media filtration and operate at low volume/high velocity and high suction pressure mode for minimal loss of tempered facility air. When equipped with suitably designed suction casings, it shall operate to effectively capture potentially harmful airborne dust at the source of grinding and sanding.

C. Capacities/Dimensions:

1. Motor: 10 HP, 7.5kW, 3450 RPM
2. Suction Rating:
 - a. Max flow: 360 SCFM
 - b. Max static pressure: 96 inches water column
3. Filtration:
 - a. Primary cyclone separator: Up to 96% of total dust, nominal
 - b. Main filter: 99.9% of total dust per DIN 24184/3
 - c. Filter area: 90.4 square feet
4. Noise rating: less than 75 dB(A)
5. Overall dimensions:
 - a. Dust collection unit:

- 1) Height: 68 inches
- 2) Width: 22 inches
- 3) Length: 49 inches

b. Cyclone pre-separator:

- 1) Height: 40inches
- 2) Width: 10 inches
- 3) Length: 15 inches

D. Features/Performance/Construction:

1. Motor: Totally enclosed, dust proof and spray proof with 10,000 hour continuous rating.
2. Vacuum producer: Direct coupled, low speed turbopump of branch canal design for production of high vacuum pressure rated for 10,000 hours continuous duty without lubrication. Vacuum relief valve to provide cooling air in the event all inlets are restricted. Unit shall be discharged trough a muffler suitable for connection to a four-inch pipe for exhausting to the outside. Particulate shall be discharged through a flap valve into a plastic sack for dust free disposal after unit has shut down.
3. Pre-separator: A high efficiency cyclone pre-separator designed to remove the bulk of dust chips installed ahead of the filter unit. The pre-separator shall be designed with a cylindrical steel body and function to remove heavy dust before reaching the dust extractor filter unit, thus greatly extending filter life.
4. Filter Unit: Body of unit shall function as a primary filtration cyclone separator and enclosed main filter. Filter shall be of pleated, polyester material suitable for fibrous dust. Service life shall be at least one year. Unit shall be equipped with self-contained reverse pulse filter cleaning.
5. Ducting: Minimum of .06 inches thickness galvanized steel pipe connections shall be butt fit with rubber lined steel band clamps to join ducting components. Clamps and ducting must be re-usable in the event of dismantling and re-configuration of the system. Pip diameter shall no exceed 3inches.
6. Suction hose: The hose and hose couplings shall be extremely flexible with smooth inside walls for low pressure drop. All hose and connectors must be conductive to eliminate static charge. Wire hose is not acceptable. Host diameter shall not exceed 3 inches.
7. Suction casings: Casings shall be mounted on the lathe to capture particulate at the source of grinding. Both casings, on for the brake drum side and one for the shoe side shall bit around the cutting bit without interfering with the process.
8. Hood assembly: A brake lathe hood assembly shall completely enclose the brake block and shoe assembly mounted on the brake lathe spindle. The Hood Assembly shall be constructed of freestanding, sheet metal assembly with a gas prop supported hinged hood. A hinged hood shall be equipped with a tempered safety glass window for viewing the in-process cutting operation. The bottom of the hood assembly shall be formed to funnel the large chips into plastic waste sack.

9. The electrical panel shall be Transmatic Series 1000 series or approved equal. Pre-wired, 460 volt, 3 phase, 60 Hertz NEMA 12 rated main control panel containing motor starters, step-down transformer for control circuits and a programmable logic controller (PLC). The PLC shall control all logic functions, system timing, and alarm functions: Electro-mechanical relays are not acceptable. The PLC shall be heavy-duty industrial type and have a minimum 1K-instruction memory, EEPROM memory back up. The control panel enclosure shall be equipped with a lockout/tag out type disconnect switch. The control panel door will include a green start button with green indicating light that illuminates when the system is started. A positive action, red, emergency stop button with oversize head. A white pilot light to indicate power to the panel. The control panel door will also include a run time (hour) meter for tracking pump run hours. Panel shall be build by a certified UL provided and include a UL listed serialized label.

E. Accessories:

1. Floor cleaning tools and pipe
2. Waste sacks, box of 50

F. Utility Requirements:

1. Electrical: 460 VAC, 3 phase, 10 HP
2. Mechanical: 4 inch Exhaust
3. Compressed air: Filter unit compressed air @ 80-90 PSI @ 8-10 CFM

G. Finish: Durable enamel in manufacturer's standard color

2.06 LIFT, MAN, SCISSORS, PNEUMATIC, SELF PROPELLED
Equipment Identifier: 5558

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. LPI Inc., Eau Claire, WI (715) 839-8280
 - b. Model: TK-48-S with accessories
2. Alternate manufacturers: Contingent *upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. Titan Air Inc., Oseo, WI (715) 597-2050

B. Capacities/Dimensions:

1. Motor: Pneumatic powered, 50 SCFM at 90 PSI

2. Lifting capacity:
 - a. Uniform load: 1,000 pounds
 - b. Concentrated load: 300 pounds
3. Vertical travel: 30 inches
4. Elevated height: See C.5 of this specification
5. Lowered height: 18 inches
6. Lift dimensions:
 - a. Platform length: 120 inches
 - b. Platform width: 42 inches
 - c. Overall height: 58 inches
7. Net weight: 1,700 pounds
8. Lifting speed:
 - a. Z axis: 15 FPM (minimum)
 - b. X axis: 40 FPM (maximum)

C. Features/Performance/Construction:

1. Unit shall be pneumatic/hydraulic powered.
2. Guide system: One side of unit shall have a single flange wheel design that runs in a guide slot in the floor. The guide slot shall be 1 by 1-1/2 inches, and shall run the full length of the desired travel area.
3. Platform shall have handrails 40 inches high and toe boards 4 inches high.
4. Platform shall have a self-closing hinged gate on one of the narrow sides of the basket.
5. Stops shall be provided on elevated height to provide 3 inches of clearance as required by OSHA between top of guardrail and building structure.
6. Standard features include:
 - a. Emergency stop
 - b. OSHA approved shut off/lockout valve
 - c. Filter/regulator/lubricator
 - d. Auxiliary air supply in basket
 - e. Holding valves to prevent descent of lift if hydraulic system fails
 - f. Auxiliary air supply for lowering lift from basket
 - g. Z-axis ground level control station (lowers only)
7. Festooning system:
 - a. Festoon track shall be mounted to the underside of the floor above. Track shall have carriers for 40 feet of travel and 50 feet of 3/4 inch air hose assembly and lighting power cable.
 - b. Festoon system shall include a minimum of four trolleys.

- c. Drag arm shall be connected to the base of the platform unit and extend vertically 10 inches from the underside of the floor above.
- d. Drag arm shall be attached to the main air supply and power through the festooning system.
- e. Festooning system shall be capable of carrying two additional lines up to 3/4 inch in diameter.

8. Lights:

- a. Explosion proof fluorescent light fixtures LDPI model 382-800-42LA or equal. Four foot two lamp explosion proof fluorescent fixtures shall be mounted to the side rails of the lift so that they are angled upwards towards the inspection pit opening.
- b. Power cable and wiring of fixtures to be provided by licensed electrician. Cable to be installed on festooning system with loops matching air supply.

9. Tool tray shall be mounted on the side rail with clips for ease of removal. Tool tray shall be 6 by 30 by 3 inches.

D. Controls:

- 1. Control box shall be mounted on the end railing and operated with a foot pedal controller.
- 2. Controls shall have a z-axis hand control with emergency stop.

E. Utility Requirements:

- 1. Compressed air: 3/4 inch, 50 SCFM, 90 PSI
- 2. Power for lights: 120 VAC, 480 W

2.07 PRESS, OIL FILTER

Equipment Identifier: 7490

A. Manufacturer's Reference:

- 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - a. Oberg International, Arlington, WA (360) 435-9100
 - b. Model: P-200L
- 2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Caterpillar Inc., Peoria, IL (309) 675-1000
 - b. Lincoln, A Pentair Company, St. Louis, MO (314) 679-4200

B. Capacities/Dimensions:

1. Motor: 1 HP
2. Hydraulic pressing force: 31,416 pounds
3. Cycle time: 35 seconds
4. Cavity size: 9 by 11 by 16 inches
5. Overall dimensions:
 - a. Width: 23-1/2 inches
 - b. Depth: 32-1/2 inches
 - c. Height: 92 inches
6. Weight: 700 pounds

C. Features/Performance/Construction:

1. Construction: All steel used in construction shall conform to American Society for Testing and Materials No. A366 specifications.
2. Material thickness:
 - a. Tower and leg components: 5/16 inch
 - b. Shrouds, top and back panels: 1/16 inch
3. Structural components: All structural components used in cylinder mounts and crusher block assemblies shall be made of A-36 merchant quality steel or better.
4. Hydraulic system: Hydraulic system components shall be designed to operate at a minimum on 2,500 PSI with a 3:1 safety factor.
5. Safety switch: Press shall be equipped with a safety switch to prevent operation when door is open.
6. Crushed filter storage: Unit shall have a trap door and provision for a 55 gallon drum to be located beneath to collect crushed filters.
7. Waste oil storage: Unit shall be plumbed directly to waste oil storage tanks located in the lower level of the Inspection Bay.
8. Shut off: Unit shall automatically shut off after each cycle.

D. Controls: Controls and electrical components shall meet applicable National Electrical Code requirements.

E. Accessories: Include 16-gallon drum with a 3/4-inch NPT outlet for waste oil collection. Drum to be plumbed to waste oil tank.

F. Utility Requirements: 120 VAC, 1 HP, 15 A

G. Finish: Durable enamel in Owner's choice of manufacturer's standard colors. All completed components shall be acid dipped prior to power coating.

2.08 NET, SAFETY, PIT, INSPECTION, 40 FEET

Equipment Identifier: 9520

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. BayNets Safety Systems, East Haddam, MA (860) 873-5192
 - b. Model: Safety Net, 40 feet (custom)
2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, *may* be considered as equal.
 - a. BRW Unlimited Services, Tomball, TX (800) 690-2683

B. Capacities/Dimensions:

1. Overall dimensions (nominal):
 - a. Length: 40 feet
 - b. Width: 42 inches
2. Overall capacity (breaking strength): 6,900 pounds

C. Features/Performance/Construction:

1. Netting shall be No. 90 nylon twisted twine with a tensile strength of 5,700 pounds.
2. Mesh spacing shall be 2-1/2 inch square to give an approximate strength of 3,224 pounds per 3 square inches.
3. Rope shall be a 5/8 inch diameter polyplus with a tensile strength of 5,700 pounds.
4. Quicklinks shall be 3/8 inch placed at 15 inch intervals (3,400 pounds safe working load).
5. Net frame shall be constructed of 1/4 inch aircraft cable and consist of No. 2 padeyes (2,250 safe working load) with 3/8 by 6 J&E turnbuckles (1,300 safe working load) at one end and 3 crosby clips at the termination end.

D. Finish: Mesh netting shall be black

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.
- B. Inspect delivered equipment for damage from shipping and exposure to weather.
- C. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect or designated representative.
- B. Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb, and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
- C. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing and installation debris from job site.

D. Notify Architect or designated representative for acceptance inspection.

3.05 TRAINING

- A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.
 - 1. 2350 Lathe, brake, drum/shoe; 4 hours
- B. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

END OF SECTION 11510

SECTION 11515

FABRICATED EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:
 - 1. 1860 Workbench, severe use, 6' (Ref. Part 2.01)
 - 2. 2030 Bench, battery (Ref. Part 2.02)
 - 3. 7190 Drops, air/electric, trapeze (Ref. Part 2.03)
- B. Installation of equipment with labor, services, and incidentals necessary for complete and operational equipment installation.

1.03 QUALITY ASSURANCE

- A. Equipment shall be manufactured by a manufacturer of established reputation with a minimum of five years experience performing similar fabrication techniques.

1.04 SUBMITTALS

- A. Shop Drawings shall be submitted in accordance with Division 1 - General Requirements of these specifications.

1.05 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.
- C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish. Defects shall

not include damage due to neglect, misuse, or situations resulting from non-performance of a manufacturer's recommended preventive maintenance schedule.

- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.
- C. Provide equipment and material specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

PART 2 - PRODUCTS

2.01 WORKBENCH, SEVERE USE, 6 FEET Equipment Identifier: 1860

- A. Manufacturer's Reference: Fabricated item as shown on Equipment Layout Drawing Sheet EQ701
- B. Capacities/Dimensions:
 - 1. Load capacity: 2,500 pounds
 - 2. Work surface thickness: 3/8 inch
 - 3. Overall dimensions:
 - a. Length: 72 inches
 - b. Depth: 32 inches
 - c. Height: 34 inches
- C. Features/Performance/Construction:
 - 1. Legs: Workbench legs shall be fabricated of 3 by 3 by 3/16 inch steel tube.
 - 2. Leg braces: Leg braces shall be 3 by 1/4 inch steel plate continuously welded to tubing.
 - 3. Top braces: Top braces shall be 3 by 3 by 1/4 inch steel angle with continuous electrical welds to tubing.
 - 4. Top: Top shall be 3/8 inch steel plate with 50 percent minimum electrical welds to top braces. Corners of top shall have a 2 inch radius for protection of personnel. All edges shall be ground smooth.
 - 5. Welds: All welds shall conform to American Welding Society standards.
- D. Finish: Cover all exposed steel surfaces including both sides of top, braces, and legs with one coat of zinc chromate primer and two coats of epoxy per manufacturer's recommendations in Owner's choice of color.

2.02 BENCH, BATTERY

Equipment Identifier: 2030

- A. Manufacturer's Reference: Custom fabricated item as shown on Equipment Layout Drawing Sheet EQ701
- B. Capacities/Dimensions:
 - 1. Capacity: 200 pounds per linear foot of bench.
 - 2. Overall dimensions, nominal:
 - a. Length: 136-1/2 inches
 - b. Depth: 24 inches
 - c. Height: 20 inches
 - 3. Dry paint thickness, minimum: 6 mils.
- C. Features/Performance/Construction:
 - 1. Construction: Bench shall be fabricated per specification and as shown.
 - 2. Materials: Unit materials shall be 2 by 4 inch Grade 1 or better hardwood (preferably smooth, straight, kiln dried oak), marine grade wood glue, and zinc plated, No. 12 by 2-3/4 inch flat head wood screws.
 - 3. Assembly: All joints shall be glued and fastened with countersunk wood screws.
- D. Finish: All exposed wood surfaces shall be sealed and finished with 1 to 1 mix of International Paint Integard-740 epoxy paint product number and curing agent number 4346-B applied per manufacturer's recommendations in Owner's choice of color.

2.03 DROPS, AIR/ELECTRIC, TRAPEZE

Equipment Identifier: 7190

- A. Manufacturer's Reference: Fabricated item as shown on Equipment Layout Drawing Sheet EQ702
- B. Capacities/Dimensions:
 - 1. Dimensions, frame:
 - a. Width: 24 inches
 - b. Depth: 2-1/4 inches
 - c. Height: 72 inches
 - 2. Dimensions, overall, nominal, less hangers:
 - a. Width: 24 inches
 - b. Depth: 12 inches
 - c. Height: 76 inches
- C. Features/Performance/Construction:
 - 1. Frame unit shall be fabricated from 2 by 1 by 1/8 inch rectangular hollow structural steel.
 - 2. Supports shall be welded link, 1/4 inch proof coil chain attached to trapeze frame

- with eyebolts and to overhead structure with appropriate shackles.
3. Frame welds shall be continuous and meet American Welding Society standards.
 4. Electrical:
 - a. 120 VAC double duplex outlet and rigid conduit shall be mounted to frame with U-bolt supports.
 - b. Flexible connection conduit shall be used to connect building and trapeze rigid conduit.
 5. Trapeze air piping and principal devices shall be as follows starting at building air piping.
 - a. Cut-off valve shall be 3/4 inch, Graco No. 107141 or approved equal, one each at connection to building air piping.
 - b. Flexible connection air line shall be used to connect building and trapeze piping.
 - c. Main leg and horizontal manifold shall be 3/4 inch, bronze pipe.
 - d. Drain valve shall be 3/4 inch, one each at bottom of main leg.
 - e. Filter/regulator/lubricator: Graco No. 217073 with 3/4 inch ports, or approved equal, shall be installed as shown.
 - f. Quick disconnect couplings shall be 3/8 inch female quick disconnect coupling, Graco No. 110198, and 1/2 inch female quick disconnect coupling, Graco No. 110199, shall be installed as shown with elbows as needed for couplings to point downward.
 6. Piping shall be substantially bracketed to frame including inlet and outlet piping from air filter/lubricator/regulator assembly.
 7. All materials, fittings, and connectors as required for a complete and operable installation shall be provided by Contractor.

D. Utility Requirements:

1. Electrical: 120 VAC, 20A
2. Compressed air: 3/4 inch, up to 120 PSI

- E. Finish: The frame shall be covered with epoxy compatible zinc chromate primer and finish coat of safety yellow epoxy enamel.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.
- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items and specified accessories.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

- B. Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb, and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
- C. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing and installation debris from job site.
- D. Notify Architect or designated representative for acceptance inspection.

END OF SECTION 11515

SECTION 13700

BASIC SECURITY SYSTEM REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.01 SUMMARY

- A. This Section includes general administrative and procedural requirements for Sections numbering 137xx , and is intended to supplement, not supersede, the requirements specified in Division 1.

- B. The requirements described herein include the following:

1. References
2. Definitions
3. System Description and Existing Conditions
4. Submittals & Shop Drawings
5. Quality Assurance
6. Permits and Inspections
7. Delivery, Storage and Handling
8. Scheduling
9. Warranty
10. Preventative Maintenance
11. Project Management and Coordination Services
12. Cutting, patching, painting and sealing
13. Field quality control
14. Project Closeout and Record Documents

- C. Products Supplied But Not Installed Under This Section:

1. None.

- D. Products Installed But Not Supplied Under This Section:

1. None.

- E. Products Specified But Not Installed Under This Section:

1. None.

- F. Products Furnished and Installed Under Another Section:

1. 120V power
2. Conduit and junction boxes
3. Network connections

G. Unit Prices:

1. Submit unit pricing (material, labor, shipping, taxes, and markups) for equipment supplied under this section.

H. Alternates:

1. ALT-13700-01: Renewable Annual Maintenance Agreement
 - a. Submit a renewable annual maintenance agreement proposal for the servicing and adjustment of the existing security system equipment.
 - b. Perform bi-annual examinations by trained personnel including necessary measurements, adjustments, and parts replacement to keep the equipment in efficient and proper operation.
 - c. Perform maintenance work, except emergency repairs, during regular working hours of regular working days.
 - d. Perform emergency repairs on an immediate basis (4 hour response time maximum, 7 days a week, 24 hours a day) when a system or component malfunctions during use.
 - e. Do not subcontract or assign maintenance work unless the Owner has approved such assignment in writing.

I. Related Sections:

1. Consult other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation.
2. Section 13720: Video Surveillance System
3. Section 13770: Security System Cabling
4. Section 13780: Security System Labeling
5. Section 13790: Security System Commissioning
6. Section 16070: Supporting Devices
7. Miscellaneous Metal Work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, equipment enclosures, cameras, and similar devices. Refer to Division 5, Miscellaneous Metals.
8. Miscellaneous Lumber and Framing Work: Include wood grounds, nailers, blocking, fasteners, and anchorage for support of security materials and equipment. Refer to Division 6, Rough Carpentry.
9. Moisture Protection and Smoke Barrier Penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. Tape and make vapor tight penetrations through vapor barriers at slabs on grade. Refer to Section 07270 Firestopping, and Section 07900 Sealants.
10. Access Panels and Doors: Required in walls, ceilings, and floors to provide access to security devices and equipment. Refer to Division 8, Access Doors; also, Division 5, Metals.
11. Painting: Include surface preparation, priming and finish coating as required for security cabinets, exposed conduit, pull and junction boxes, and devices where indicated as field painted in this Division. Refer to Division 9, Painting.

1.02 REFERENCES

- A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
- B. Codes: Perform Work executed under this Section in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
 - 1. National Electric Code (NEC), NFPA 70.
 - 2. California Code of Regulations (CCR) Title 24, California Building Standards Code Part 2, Basic Building Regulations and Part 3, California Electrical Code (CEC).
 - 3. Uniform Building Code (UBC).
 - 4. Uniform Fire Code (UFC).
 - 5. National, State, Local and other binding building and fire codes.
 - 6. FCC Regulations:
 - a. Part 15 – Radio Frequency Devices & Radiation Limits
- C. Standards: Equipment and materials furnished under this Section shall conform to the following standards where applicable:
 - 1. Underwriter's Laboratories (UL): Applicable listing and ratings.
 - a. UL 294: Access Control System Units
 - b. UL 1076: Proprietary Burglar Alarm Units and Systems

1.03 DEFINITIONS

- A. The following list of terms as used in this Section shall be defined as follows:
 - 1. "Owner": Santa Cruz Metro Transit District (SCMTD)
 - 2. "Engineer": TEECOM Design Group.
 - 3. "Furnish": To purchase, procure, acquire, and deliver complete with related accessories.
 - 4. "Install": To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Installation shall be complete and ready for regular operation.
 - 5. "Provide": To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation.
 - 6. "Connect": To install required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
 - 7. "As directed": As directed or instructed by the Owner, or their authorized representative.
 - 8. "Cabling": A combination of cables, wire, cords, and connecting hardware [e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling].
 - 9. "Security System": The CCTV System.
 - 10. "SEC": Security Equipment Enclosure.

11. "CEC": CCTV Equipment Enclosure.

1.04 SYSTEM DESCRIPTION

A. Overview

1. Santa Cruz Metropolitan Transit District is building a new Service Building. The new facility will be located on River Road in Santa Cruz, California.
2. The facility will employ access control and video surveillance security systems.
3. Video Surveillance will be deployed in the Maintenance Building. Monitoring of the Maintenance Building CCTV cameras will be from the existing dispatch office.

B. Conduit System

1. Provide conduit, junction boxes, connectors, and J-hanger system to support the security system cabling.

C. Custom Device Requirements

1. General: Provide a high level of coordination services to ensure the proper installation and functioning of the security system. Coordinate the installation of the security system with other trades. This may include: review of other's subcontractor's shop drawings, attendance at meetings, providing samples for mockup, and preparation & distribution of written documentation.

D. Role of the Engineer

1. During the construction phase of the project, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, process and reply to relevant Requests for Information (RFI), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for general compliance with the Contract Documents.
3. In summary, the Engineer will perform the following specific services during the design phase:
 - a. Review product submittals and shop drawings for general compliance with the contract drawings and specifications.
 - b. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.
 - c. Interpret field problems for Owner, and translate into understandable language.
 - d. Review the testing procedures to confirm compliance with industry-accepted practices.

E. Drawings

1. Layout: Follow the general layout shown on the Drawings except where other work may conflict with the Drawings.
2. Accuracy: The Drawings show a diagrammatic representation of the system within the constraints of the symbology applied.
3. Detail: The Drawings do not fully represent the entire installation for the Security

System. Drawings indicate the layout and location of control console(s) components, as well as location of security devices, i.e. CCTV cameras, card readers, door locks and contacts, and duress stations. The Drawings do not show conduits, wire and cabling between every system component, equipment, or device.

1.05 SUBMITTALS

A. General

1. Provide required submittals in accordance with Conditions of the Contract, and Division 1 Submittal Procedures Section.
2. Format: Furnish submittal data neatly bound in an 8-1/2" x 11" folder or binder for each specification section with a table of contents listing materials by Section and paragraph number.
3. Submittals shall consist of detailed shop drawings, product specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded.
4. Label each submittal with the Specification Section Number and provide a cover letter or stamp stating that the submittal has been thoroughly reviewed by the Contractor and complies with the requirements of the Contract Documents. Failure to comply with this requirement shall constitute grounds for rejection of data.
5. Resubmittals shall include a cover letter, which lists the action taken, and revisions made to each drawing and equipment data sheet in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.
6. Prepare diagrams using AutoCAD 2000 compatible software. The following are requirements for drawings:
 - a. Drawing Size: Same size as the project contract drawings with the project title block.
 - b. Text Size: Minimum 3/32 inches high when plotted at full size.
 - c. Symbology: Identical to the symbols used on the Contract Drawings.
 - d. Backgrounds: Screen background information to allow pertinent drawing information to stand out.
 - e. Line Weights: Use appropriate line weights for devices, raceways, and text to stand out against background information.

B. Contractor Qualifications: Submit the following for review and comment at the beginning of the project.

1. Resumes of the Project Manager, General Foreman, and Lead Technician(s) indicating role, years of experience, product certifications and training, listing of similar projects the individual performed the role proposed for this project along with client contact information for each.
2. Certification letters from manufacturers of major system components stating the Contractor is an authorized reseller, installer, and extended warranty provider for the specified security systems.

- C. Product Data: Submit the following for review and comment prior to the purchase and installation of equipment:
 - 1. Product data for products furnished. Include, for each product, the manufacturer, part number, accessories & options selected, color (if applicable), and a brief product description.
 - 2. Estimated delivery lead times for products.

- D. Shop Drawings
 - 1. Obtain electronic files containing the contract documents drawing files for use in preparing the shop drawings from the Engineer.
 - 2. Submit the following for review and approval prior to the installation of equipment:
 - a. Floor Plans: 1/8 inch scale floor and site plans showing the locations of devices and cable routing paths with cable types and quantity called out.

- E. Samples
 - 1. Labeling
 - 2. Provide samples as required for proper coordination and installation of custom mounted equipment.

1.06 QUALITY ASSURANCE

A. General

- 1. Provide new and unused materials, equipment, and parts comprising the units specified herein of current manufacturer and of highest grade.
- 2. Only use products and applications listed in this Division on the project.

B. Substitutions

- 1. Where items are noted as "or equivalent", a product of equivalent design, construction and performance will be considered. Submit to the engineer pertinent test data, catalog cuts and product information required to substantiate that the product is in fact equivalent to that specified. Only one substitution will be considered for each product specified.
- 2. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment, which in the opinion of the Engineer, are equivalent in quality, utility and appearance will be approved as substitutions to that specified.
- 3. Whenever material, process or equipment is specified in accordance with a Federal specification, an ASTM standard, an ANSI specification, UL rating or other association standard, present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, support test data to substantiate compliance shall be submitted at no additional cost.
- 4. Substitutions shall be equivalent, in the opinion of the Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equivalent to the

one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from provisions of the Specifications.

5. Pay for unforeseen increased costs resulting from substituted products at no additional cost to the Owner.

1.07 PERMITS AND INSPECTIONS

- A. Obtain and pay for permits and inspections required for the work.
- B. Furnish materials and workmanship for this work in conformance with applicable legal and code requirements.
- C. Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of legal authority having jurisdiction.
- D. Obtain review from compliance officials responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with requirements of reference codes indicated herein.

1.08 COORDINATION

- A. Discrepancies
 1. In the event of discrepancies within the Contract Documents, notify the Engineer within 5 days prior to the Bid Opening to allow the issuance of an Addendum.
 2. If, in the event that time does not permit notification or clarification of discrepancies prior to the Bid Opening, the following shall apply: The drawings govern in matters of quantity, and the specifications govern in matters of quality. In the event of conflict within the drawings involving quantities, or within the specifications involving quantities, or within the specifications involving quality, the greater quantity and higher quality shall apply. Note such discrepancies and clarify in the Bid. We will make no additional allowances because of errors, ambiguities, or omissions, which reasonably should have been discovered during the preparation of the Bid.
- B. Job Conditions
 1. Protection: Keep conduits, junction boxes, outlet boxes and other openings closed to prevent entry of foreign matter. Cover equipment, devices, apparatus and protect them against dirt, paint, water, chemical or mechanical damage, before and during construction period. Prior to final acceptance, restore to original condition fixture, apparatus or equipment damaged including restoration of damaged factory applied painted finishes. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.
 2. Supervision: Personally, or through an authorized and competent representative, supervise the work from beginning to completion and, within reason, keep the same foreman and workmen on the project throughout the project duration.

1.09 PROJECT MANAGEMENT AND COORDINATION SERVICES

- A. Overview: Provide a project manager/engineer for the duration of the project to coordinate the security system work with other trades. Coordination services,

procedures and documentation responsibility shall include, but shall not be limited to the items listed in this section.

1. Obtain copies of shop drawings for equipment provided by others that require security connections or interface with the security system work.
2. Prepare and maintain a shop drawing review log indicating the following information:
 - a. Shop drawing number and brief description of the system/material.
 - b. Date of your review.
 - c. Indication if follow-up coordination is required.

B. Request for Information (RFI)

1. Thoroughly review the contract documents prior to the preparation and submission of an RFI. If an RFI is submitted, attach 8 1/2" x 11" copies of relevant documents to clarify the issue.
2. Submit RFIs with your recommended solution.
3. Prepare and maintain an RFI log using a Microsoft Excel spreadsheet indicating the following information:
 - a. RFI number and brief summary of the issue.
 - b. Date of issuance and receipt of response.

C. Clarification Confirmation Memo (CCM)

1. CCM memos will be prepared by either the Contractor or the Engineer to confirm a decision clarifying the contract documents that does not impact cost or affect other trades.
2. Prepare and maintain a CCM log using a Microsoft Excel spreadsheet indicating the following information:
 - a. CCM number... use CCM-C1, C2, etc. for memos issued by the Contractor and CCM-E1, E2, etc. for memos issued by the engineer.
 - b. Brief summary of issue and date issued.

D. Scheduling of Work

1. Prepare work schedules for each floor indicating the following information:
 - a. Cable Installation
 - b. SEC Build Out
 - c. Device Installation
 - d. Programming
 - e. Testing
 - f. Other tasks included under the alternate work section of these specifications

E. Weekly Status Reports

1. Prepare weekly status reports throughout the entire course of the project containing the following information:
 - a. Updated 2-week look ahead schedule
 - b. Progress during prior week

- c. Work expected to be completed during the upcoming week.
- d. Delivery dates for equipment
- e. Coordination status for each device requiring coordination with other subcontractors.
- f. Summary of the information owed to the Contractor, who is responsible for providing the information, and due date for the information.

F. Weekly Meetings

1. Conduct or attend weekly coordination meetings with the electrical and other specialty subcontractors to coordinate the installation of the security systems.

1.10 CHANGE ORDER PRICING PROCEDURES

A. Pricing Submission Policy:

1. The unit prices quoted on the Bid Form will be used to adjust the contract amount for the addition or deletion of devices when these modifications are made prior to the start of construction or during the early stages of construction.
2. Change order pricing for: 1) Changes made after the contract work has been completed in an area, 2) Additional conduit and/or cable service lengths in excess of those indicated in the unit price descriptions, or 3) Work not covered by unit price quotes, will be based upon estimated time and materials. The below described estimating guidelines (General Guidelines) may not apply in instances, in which case work may be, at the Owner's option, performed on an actual time and material basis with or without a not to exceed limit. Additionally, these guidelines will be modified, if special circumstances exist such as particularly easy or difficult to access work or an unusually high volume of changes disrupts significantly the flow of the base contract work.
3. Submit copies of take-off sheets and pricing sheets to substantiate the price adjustment request.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Do not deliver security system components to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable.
2. Replace equipment damaged during shipping and return to manufacturer at no cost to the Owner.

B. Storage

1. Store materials in a clean, dry, ventilated space free from temperature extremes.
2. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
3. Provide heat where required to prevent condensation or temperature related damage.

C. Handling

1. Handle in accordance with manufacturer's written instructions.
2. Prevent internal component damage, breakage, denting and scoring. Do not

install damaged equipment. Replace damaged equipment and return equipment to manufacturer.

1.12 WARRANTY

- A. Provide the Security System as described in this specification with a one-year parts and service warranty at no additional cost to the Owner.
- B. The warranty package shall include but not necessarily be limited to the following:
 - 1. Emergency maintenance service on regular working hour basis
 - 2. Service by factory trained and employed service representatives of system manufacturer.
- C. Maintain regular service facilities and provide a qualified technician familiar with this work at the site within four (4) hours of receipt of a notice of malfunction including weekends and holidays. Provide material, devices equipment and personnel necessary for repairs. Install approved temporary, alternate equipment if required by the Owner, complete and operational within twenty-four (24) hours after notification of a malfunction, at no additional cost.
- D. Conduct warranty repairs and service at the job site unless in violation of manufacturer's warranty; in the latter event, provide substitute systems, equipment and/or devices, acceptable to the Owner, for the duration of such off-site repairs. Transport warranty substitute and/or test systems, equipment, devices, material, parts and personnel to and from the job site at no additional cost.

1.13 MAINTENANCE

- A. Extra Materials
 - 1. Deliver extra materials to a secured location determined by the Owner.
 - 2. Provide a complete Bill of Materials listing quantities, part numbers, and descriptions for each device for the Owner to sign indicating receipt of equipment.
 - 3. Provide new and unused spare parts in their original packing materials upon delivery.
- B. Maintenance Service
 - 1. For the first year of service, conduct quarterly system performance review meetings to review system operation problems and/or defects that occurred during the preceding 3 months. During these performance review meetings, perform the following:
 - a. Visual checks and operational tests of the central processor, local processors, monitors, keyboards, system printers, peripheral equipment, Access Control System equipment, power supplies, and electrical and mechanical controls.
 - b. Clean system equipment, including interior and exterior surfaces.
 - c. Perform diagnostics on equipment.
 - d. Check and calibrate each ACS device.
 - e. Run system software and correct diagnosed problems.
 - f. Resolve previous outstanding problems.

2. Provide software and firmware updates issued free of charge by the manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Material and equipment specified herein have been selected as the basis of acceptable quality and performance and have been coordinated to function as components of the included systems. Where a particular material, device, equipment or system is specified directly, the current manufacturer's specification for same is a part of these specifications, as if completely elaborated herein.
- B. Use standard, regularly manufactured, materials and equipment for this and/or other similar systems, and not custom designed especially for this project. Systems and components shall have been thoroughly tested and proven in actual use. Subsystems shall be of one manufacturer.

2.02 EQUIPMENT ENCLOSURES

- A. Manufacturer: Hoffman, or equivalent.
- B. General: Provide cabinets with:
 1. Hinged and lockable door containing a Hoffman #A-L12AR lock kit (keyed alike with other security enclosures on the project).
 2. Panduit "F" type slotted duct for routing of individual conductors.
 3. One tamper switch for each enclosure.
- C. SECs
 1. Type: Hoffman #A-16N16BLP NEMA type 1 enclosure.
 2. Accessories:
 - a. #A-16N16MP back panel for mounting of the relays, and terminal strips.
 - b. One 5" electric muffin fan for each enclosure housing electrically powered devices.
 - c. One exterior screen for each fan.
- D. Door Equipment Junction Boxes
 1. Type: Hoffman #A-10N10ALP NEMA type 1 enclosure
 2. Accessories:
 - a. #A-10N10MP back panel for mounting of the relays, and terminal strips.

2.03 POWER SUPPLIES AND BATTERY CHARGERS

- A. General:
 1. Provide power supplies with the following features:
 - a. AC power fail supervision (form "C" contact).
 - b. Low battery supervision (form "C" contact).

- c. Low battery disconnect feature to prevent battery from deep discharge.
 - d. Built-in charger for sealed lead acid or gel type batteries.
 - e. Automatic switchover to battery when AC power fails.
 - f. Thermal and short circuit protection with automatic rested.
 - g. Fused battery protection.
 - h. AC input and DC output LED indicators.
- 2. Size power supplies for maximum loading of 75% of rated continuous capacity.
 - 3. Size batteries to provide 2 hours of continuous power backup at the rated continuous current.
- B. Device Power Supplies:
- 1. Provide a 120 VAC input 12 VDC output, continuous current, fully supervised power supplies for power to motion detectors, and other similarly power security devices.
 - 2. Device Power: Altronix AL600ULX .
 - 3. Device Power: Securitron #BPS-12-6 with 8-output expander card #CCB-8.
- C. Specialty Power Supplies: Refer to the individual system specifications for specialty power supply requirements for access control systems, intercoms, video surveillance, or long range card readers.

2.04 MISCELLANEOUS INTERFACE RELAYS

- A. Type: Standard industry control, plug-in type with LED indicator lights to indicate when the relay is energized.
- B. Contacts: Rated for 10 amps at 120VAC.
- C. Coil Operating Voltage: As required, with 24VDC as first choice.
- D. Relays shall incorporate the following features
 - 1. Snap-on label
 - 2. Pilot light
 - 3. 2mm test jacks
 - 4. Dual contact markings
 - 5. Snap-on number & letter markers
 - 6. Solid bus-bar socket construction
- E. Mount relay bases on standard mounting rails.
- F. Use these relays for lock power switching application and. Do not use the output contacts on the access controllers since their rating is not adequate.
- G. Manufacturer: Releco by Turck, Idec or Equal

2.05 TAMPER RESISTANT HARDWARE

- A. Provide pinned-allen type hardware for exposed hardware in public spaces.
- B. Hardware used in specialty metal surfaces shall possess a similar finish color.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Conditions: Verify existing conditions, which have been previously provided under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. Pathways: Verify that pathways and supporting devices, which have been previously provided under other sections, are properly installed, and that temporary supports and devices have been removed.
- C. Field Measurements: Verify dimensions of pathways, including length of pathways. For example, "True Tape" the conduits to verify cable distances.

3.02 FIELD QUALITY CONTROL

- A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Perform the Work using skilled technicians under the direction of the foreman. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule. Do not change the supervisor during the project without prior written approval from the Owner.
- B. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion, and inspection as required.

3.03 INSTALLATION

- A. Perform this work in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.
- B. Provide a complete, operating system. Include devices specified including basic components and accessories, interconnecting wiring and other equipment and installation devices necessary for a complete system as specified.
- C. Manufacturer's Instructions:
 - 1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
 - 2. Maintain jobsite file of Material Safety Data Sheets (MSDS) for each product delivered to jobsite.
- D. Boxes, Panels, and Enclosures
 - 1. Install boxes, panels, and enclosures square and plumb.
 - 2. Set "flush mounted" units so that the face of the cover, bezel or escutcheon shall be in the same plane as the surrounding finished surface.
 - 3. Mount boxes, panels and trim so that there are no gaps, cracks or obvious lines between the trim and the adjacent finished surface and ready them to receive final finish, as applicable.

4. Install insulating terminations in signal circuit boxes, panels, wireways or enclosures.

E. Painting

1. Custom paint devices as indicated on the drawings.

3.04 REPAIR AND RESTORATION

- A. Replace or repair work completed by others that you deface or destroy, at not cost to the Owner.

B. Punch List:

1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
2. Provide punch list to Engineer for review prior to performing punch walk with the Engineer.

C. Re-Installation:

1. Make changes to the system such that any defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
2. Repair defects prior to system acceptance.

3.05 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.

- B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

- C. Repair or replace damaged installed products.

- D. Legally dispose of debris.

- E. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

END OF SECTION 13700

SECTION 13720

VIDEO SURVEILLANCE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. General: Provide engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services as required to make a complete working video surveillance system installation, as described in this specification.
- B. Section Includes:
 - 1. CCTV Monitoring and Recording System
 - 2. CCTV cameras, lenses, mounts, and housings
 - 3. CCTV Power supplies
 - 4. Interfaces and connections between CCTV subsystems to allow communication with one another
- C. Products Supplied But Not Installed Under This Section:
 - 1. None
- D. Products Installed But Not Supplied Under This Section:
 - 1. None
- E. Products Specified But Not Installed Under This Section:
 - 1. None
- F. Products Furnished and Installed Under Another Section:
 - 1. 120V power.
 - 2. Network ports in the IDF for CCTV connectivity via WAN
- G. Related Sections:
 - 1. Consult other Divisions, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
 - 2. Section 13700 Basic Security Requirements: includes general project requirements, submittal formats, installation, and warranty requirements.
 - 3. Section 13770 Security System Cabling: includes product information for wire and cable needed to support the video surveillance system.
 - 4. Section 13780 Security System Labeling: includes label types and formats for security devices.

5. Section 13790 Testing/Commissioning: includes the integrating testing/commissioning requirements for the video surveillance system.

1.03 DEFINITIONS

A. The following list of terms as used in this Section shall be defined as follows:

1. "CCTV": Closed Circuit Television
2. "DVR": Digital Video Recorder
3. "PTZ": Pan/Tilt/Zoom

1.04 SYSTEM DESCRIPTION

A. Overview

1. The project requires video surveillance of the Maintenance facility and parking lot.
2. The Maintenance facility cameras recorded 24 hours.

B. CCTV Camera System

1. Provide fixed cameras as indicated on the drawings.
2. Provide low light level fixed cameras for exterior building cameras.
3. Provide 9-channel DVR in the Maintenance Facility to record fixed cameras. Rack mount DVR.
4. Utilize SCMTD TCP/IP based network for connectivity between DVRs.
5. Utilize existing remote DVR viewing capabilities installed on Owner provided PC located in the existing Dispatch Office.
6. Provide UPS for DVR.

C. Custom Device Requirements

1. Coordinate installation of wall mounted flat screen video monitors in the dispatch area with the Architect. Provide detailed shop drawings showing planned installation method and requirements.

1.05 SUBMITTALS

A. Contractor Qualifications: Submit certifications for the manufacturers of the video surveillance equipment.

B. Product Data: Submit product information for components specified herein.

C. Shop Drawings:

1. Device placement on floor plans
2. Point-to-Point Diagrams: Include wiring, points of connection and interconnecting devices between the following:
 - a. Video surveillance system, monitors, and recording equipment
 - b. Devices connected to the system
 - c. Miscellaneous control relays
 - d. Conductors (identify conductors on the point-to-point diagrams with the same tag as the installed conductor)

3. Block Diagram/Riser Diagram: Show the video surveillance system components, conduit, wire types, and sizes between them, including cabling interties between termination hardware.
4. User interface graphics with icons and control buttons displayed.
5. Custom mounting details

1.06 EXTRA MATERIALS

- A. Provide 10% spare parts of total installed the following: (Round up to the next complete device)
 1. Cameras (fixed)
 2. Fuses (Place five (5) of each type of fuse inside each SEC and power supply housing).
 3. Relays

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Video Surveillance System
 1. Pelco, to match Service Building system standard.

2.02 CCTV CAMERA SYSTEM

- A. General
 1. Type: Color, solid-state CCD with DSP technology, unless otherwise noted.
 2. Power: 24 VAC, 60Hz.
 3. Imager: 1/3 inch format, unless otherwise noted.
 4. Lens Mount: Accept a "CS" mount auto or manual-iris lens.
 5. Synch: Adjustable line lock for synchronizing camera to power line. No auxiliary sync cable required.
 6. Resolution: 460 TVL minimum resolution (EIA RS-170), unless otherwise noted.
 7. Minimum Light Level: 0.1 fc imager illumination at full video, unless otherwise noted.
 8. Lens: Field determine, unless otherwise noted.
- B. Standard Fixed Camera
 1. Manufacturer:
 - a. Pelco #CC3710H
- C. Low Light Level Cameras
 1. Type: Monochrome
 2. Resolution: Minimum 380 TVL (EIA RS-170).
 3. Minimum Light Level: 0.06 lux at F1.2 (30 IRE) illumination at full video.

4. Manufacturer:
 - a. Pelco #CC3770H

2.03 CCTV CAMERA LENSES

A. General

1. Built from the finest optics available for use on a CCTV surveillance type camera.
2. Contain integral intraspot filters.
3. Format to match CCD imager.
4. Varifocal: Lens: 5-40 varifocal
5. Auto-iris connector coordinated with the camera type (i.e., 4-pin vs. 6-pin).
6. CS type mount.
7. Manufacturer:
 - a. Pelco #13VD5-50

2.04 CAMERA MOUNTS & HOUSINGS

A. Exterior Wall Mounted Housing – Fixed Camera

1. Mount: Pelco #EM3512 wall mount
2. Housing: Pelco # EH3512-3HD Outdoor housing with heater, blower and lock

2.05 CCTV DIGITAL VIDEO RECORDER

A. General

1. Complete Digital Video Management System (DVMS) that encompasses recording video, viewing video, reviewing recorded video, and storing video for indefinite periods of time. System components are linked together via a computer network.
2. The system simultaneously records, displays live video, and plays back video. None of the video operations interfere with each other. Recording does not stop for playback, live video view, or video storage.
3. Recorders are provided for capturing, digitizing, and storing video. Recorders may be configured to record full-time, to record in response to an alarm, or to record based on a user-defined schedule. Full-time recording refers to 24 hours per day, 7 days per week, 365 days per year.
4. Live view and video playback does not interrupt the recording process.
5. A reporting utility provides tracking of alarms, incidents, operator logs, Point of Sale (POS) transactions, and service requests. Video and images may be stored with reports for documenting events.
6. Video authentication provides confidence the video has not been altered. It uses mathematical “fingerprints” to verify the authenticity of the video. Video encryption is not used.

B. Recorders

1. Use TCP/IP network protocol to communicate to server.
2. Built in, internal Ethernet card for connection to a 10Base T or 100Base T LAN.
3. Captures camera signals from fixed cameras, PTZ cameras, infrared cameras, x-ray cameras, and low light cameras. Camera signals may be color, black and

- white, or both.
4. Video Information
 - a. The recorder shall store the time, date, and source of the video and is to be available during playback.
 - b. The video source, capture date, start time, and stop time are stored for each clip. The source is identified as either a monitor or a camera.
 - c. The alarm information is stored in the database on the main server when the video is in response to an alarm condition.

 5. Recording Configuration
 - a. Shall use TCP/IP network protocol to communicate to head end.
 - b. Captures camera signals from fixed cameras, PTZ cameras, infrared cameras, x-ray cameras, and low light cameras. Camera signals may be color, black and white, or both.
 - c. Recorders shall be capable of recording video with or without sending the video to tape.

 6. Video Storage
 - a. Video is stored in clips on the recorder's internal hard drive. As the hard drive becomes full, the oldest clips are groomed to make room for new video.
 - b. After a video file is saved to the internal hard drive, it can be sent to tape.
 - c. The length of time video is to be stored on tape is specified per camera with respect to recorder and server configurations.

 7. Video Authentication
 - a. Each video clip is fingerprinted through a mathematical algorithm during the video capture process. The fingerprint shall become part of the clip and used by the playback software to verify the video has not been altered.

 8. Alarm recording
 - a. Recording Options
 - 1) Alarm condition via activation of an external alarm contact.
 - 2) Video motion detection.
 - b. Recording programmable by camera and by time and date schedule.
 - c. Allow a mix and match of continuous recording and alarm recording, based on camera input and capture card connection.

 9. Video Motion Detection
 - a. Each video input capable of detecting activity from camera input and to initiate an alarm condition.
 - b. The area of video motion detection shall be operator selectable for each camera input. If the scene changes within the alarm area, an alarm condition is initiated.

10. Manufacturer:

- a. Pelco: #DX Series

C. UPS:

1. APC #BP650S by BEST or equal for backup of one CPU and one monitor. Connect UPS alarm condition output relay to security system. Provide smart software interface with UPS and NT operating system to facilitate automatic shut-down. Provide a separate UPS for each required workstation.

2.06 CCTV LIGHTNING PROTECTORS

A. Video Line Coaxial Cable Protectors

1. Provide on coaxial cables serving exterior cameras.
2. Manufacturer: PolyPhaser Corp #IS-75BB/1.5, DITEK, or equivalent

B. Power Line Protectors

1. Provide on power lines serving exterior cameras.
2. Manufacturer: PolyPhaser Corp #IS-SPTV, DITEK, or equivalent

2.07 POWER SUPPLIES/BATTERY CHARGERS

A. CCTV System Power Supplies

1. 120 VAC input to 24 VAC output, continuous current, fully supervised power supplies for power to cameras.
2. Manufacturer:
 - a. Pelco #MSC-16-10SB UL listed power supply/batter charger, Kalatel, Altronix, or equivalent.

B. Exterior PTZ Camera Power Supplies

1. Provide a 120 VAC input to 24 VAC output, continuous current, fully supervised power supply for each for each exterior PTZ camera.
2. Provide separate transformers and cables for the defroster/heater in each exterior camera housing; i.e. do not connect these loads to the camera power supply. A maximum of two exterior camera defroster/heaters may be connected per power supply.
3. Power supply shall be weatherproof.
4. Manufacturer: Pelco # WCS1-4, Kalatel, Altronix, or equivalent.

PART 3 - EXECUTION

3.01 INSTALLATION

A. CCTV Cameras

1. Provide outdoor housing and mounts for exterior cameras.
2. Exact placement of cameras shall be field determined to ensure complete

- coverage.
- 3. Fixed camera lenses shall be field determined to ensure complete.
- 4. Route watertight flex from junction box to camera housing from below on exterior cameras.

B. CCTV Digital Recording System

- 1. Rack mount CCTV equipment located in the Telecom Room.

3.02 PROGRAMMING

- A. Prior to the completion of construction schedule a meeting with the Owner to determine the programming criteria. Discuss the following:
 - 1. Camera naming.
 - 2. CCTV camera call-up & recording features (including video motion detection)
 - 3. System data base backup to DAT
- B. Document the results of the meeting and perform necessary programming to achieve the Owner's requests.
- C. Setup and program the system such that no additional programming required.
- D. Use the camera naming convention agreed upon at in the programming meeting when programming point names into the system.
- E. Perform 2 full system back-ups at completion of initial programming and deliver one copy to the Owner with a Letter of Transmittal explaining information included in back-up and brief description of recovery procedures. Label the second DAT and store onsite. Perform back-ups on a regular bases through the remainder of the project.
- F. Perform field software changes after the initial programming session to "fine tune" operating parameters and sequence of operations based on revised operating requirements.

END OF SECTION 13720

SECTION 13770

SECURITY SYSTEM CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working security system installation, as described in these specifications.
- B. Section Includes:
 - 1. Wire and cable.
- C. Related Sections:
 - 1. Consult other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
 - 2. Section 13700 Basic Security Requirements: includes general project requirements, submittal formats, installation, and warranty requirements.
 - 3. Section 13780 Labeling: includes label types and formats.
 - 4. Section 16111 Conduit: includes pathway types in different areas of the project.

1.03 SUBMITTALS

- A. Product Data: Submit product information, including:
 - 1. Cable Description and Use
 - 2. Jacket Rating
 - 3. Outside Diameter (of the overall wire or cable)
 - 4. Manufacturer
 - 5. Part Number

PART 2 - PRODUCTS

2.01 WIRE AND CABLE

- A. General
 - 1. Provide required wire and cable sized to allow for voltage drop on long runs and effectively shielded as required to allow the routing of 12 & 24V power and video signal cable in the same conduit without interference or signal noise.
 - 2. Cable installed outdoors shall contain a PVC or Polyethylene jacket, flooded to prevent water intrusion.

3. Cables installed indoors shall contain a plenum rated jacket (type CMP).

B. Manufacturers

1. Provide cable by Westpenn, Belden, Commscope, or equivalent.

C. CCTV Coaxial Cable

1. Provide minimum RG-59/U CCTV video coaxial cable between the camera and the monitoring equipment. Coaxial cable shall have the following features:

- a. 95% percent copper braid.
- b. Foam dielectric.
- c. Solid copper core.
- d. 75 ohm characteristic impedance.
- e. Plenum jacket.

2. Manufacturer: West Penn #25815.

3. Provide West Penn #825 with a black jacket for CCTV video cross-connect/patch cabling under 15' in length.

4. BNC Connectors

- a. Provide 3 piece BNC connectors designed for the specific coaxial cable used.
- b. Use cable manufactures recommended BNC connector for type and size of coaxial cable.
- c. Use correct full cycle ratcheting crimper manufactured for the specific BNC connector.

2.02 CABLE HANGERS ("J-HOOKS")

A. Application: Suitable for indoor installation within ceiling space for the support of communications cables.

B. Manufacturer:

1. B-Line #BCH21 (or variation per installation method); hanger for up to 40 cables
2. B-Line #BCH32 (or variation per installation method); hanger for up to 90 cables
3. Erico
4. Panduit
5. Or Equal

PART 3 - EXECUTION

3.01 INSTALLATION

A. Label cables in accordance with Section 13780 – Security Labeling.

B. Secure wire and cable run vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Secure non-coaxial cables using screw-flange nylon cable ties or similar approved devices, Thomas and Betts or equivalent. Provide symmetrical clamping devices with split, circular or other wire conforming, nonmetallic bushings for coaxial cables.

- C. Provide wire and cable with a continuous, splice-free sheath for the entire length of run between designated connections or terminations.
- D. Make connections to screw-type barrier blocks with insulated crimp-type spade lugs. Size lugs properly to assure high electrical integrity, i.e., low resistance connections.
- E. Lace, tie or harness wire or cable as required herein, and in accordance with accepted professional practice. Dress, lace or harness wire and cable to prevent mechanical stress on electrical connections; do not support wire or cable from a connection point.
- F. Dress and secure coaxial cables to preclude stress and/or deformation.
- G. Wiring for shielding certain conductors from others or routing in separate raceways, shall be as recommended by the manufacturer's current requirements.
- H. Provide necessary tie wires.
- I. Do not run signal wire and cable in parallel to power (120VAC).
- J. Follow manufacturers recommended guidelines for installation.

3.02 SIGNAL GROUNDING

- A. Ground SEC enclosures to nearest Telecommunications Grounding Busbar using an insulated #6 AWG (colored green) copper conductor.
- B. Provide termination busbar for shielded cables in SEC enclosure.
- C. Terminate shield drain wire at source end only (i.e., at SEC enclosure, not at the device)
- D. Provide continuous circuit above ground along entire circuit from load end (reader) to source end (ACU).
- E. Tape-off at drain wire a device, do not terminate.
- F. Comply with manufacturers recommended grounding requirements.

3.03 CABLE SUPPORT

- A. Horizontal Support
 - 1. Concrete and Metal construction (Above Ceiling)
 - a. Provide separate and dedicated cable support system for security cable runs. Anchor cable support system to structural ceiling. Support and tie cables at a maximum of 5 foot intervals.
 - 2. Wood Construction (above ceiling and no ceiling)
 - a. Support cable utilizing appropriately sized drive rings or "D" rings.
 - b. Fasten rings to structural ceiling.
 - c. Install drive rings at approximately 5 foot intervals.

- d. Route cable through drive rings and cable tie at 10 foot intervals, or every other drive.

B. Vertical Support

1. Riser Systems

- a. Route cable through conduit in vertical riser systems.
- b. Terminate conduit at each stacked closet in a junction box. Use 12"x10"x8" junction box as a minimum.
- c. Fastened entire cable group to the inside of junction box at every other floor or approximately every 24 feet.
- d. Fasten cable in Junction box utilizing cable ties equipped with eyelets designed to accept screws for fastening or approved equivalent method.

2. Vertical cable on floor space not in riser system

- a. Route cable from below suspended ceiling devices to above ceiling when possible.
 - 1) Provide conduit and firestopping for cable routed in fire rated wall assemblies.
 - 2) Provide conduit for cable routed from below ceiling devices to above ceiling on concrete tilt up style walls.
- b. Cable routed vertically from devices with no suspended ceiling.
 - 1) Provide conduit stub from device junction box to 14 feet A.F.F minimum.

END OF SECTION 13770

SECTION 13780

SECURITY SYSTEM LABELING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working security system installation, as described in these specifications.
- B. Section Includes:
 - 1. Labeling of wire, cable, security devices, enclosures, and raceways.
- C. Related Sections:
 - 1. Consult other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
 - 2. Section 13700 Basic Security Requirements: includes general project requirements, submittal formats, warranty, and installation requirements.

1.03 SUBMITTALS

- A. Product Data: Submit the following:
 - 1. Product information for components specified herein.
 - 2. List of equipment (wire, cable, devices, enclosures, and raceways) and the corresponding text for the label.
- B. Labeling Sample:
 - 1. Submit two sets of physical product samples for review and comment by Engineer and Owner prior to the installation of equipment:

PART 2 - PRODUCTS

2.01 NAMEPLATES

- A. Engraved, plastic laminated nameplates, signs, and instruction plates. Engrave stock melamine plastic laminate 1/16 inch minimum thickness for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Engraved nameplates shall have white letters and be punched for mechanical fasteners.

2.02 LABELS

- A. Manufacturer: Brady, or Thomas and Betts.
- B. Wire and Cable Labels:
 - 1. Self-laminating adhesive laser labels.
 - 2. Machine printable with a laser printer.
 - 3. Printable area: X inches by X inches.
 - 4. Cable size: 0.16 – 0.32” OD
 - 5. Color: white with black lettering
 - 6. Manufacturer: Brady wire marking labels WML–211-295 and WML-311-292.
- C. Device Labels:
 - 1. Self-laminating, type on tape, adhesive labels. Use Helvetica 12 pt text.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General Requirements:
 - 1. Label the security system components. The components shall include, but are not limited to, the following:
 - a. Equipment Enclosures.
 - b. Conduits.
 - c. Security Devices.
 - d. Batteries.
 - e. Wires and Cables.
 - f. Equipment Racks.
 - g. Terminal Blocks.
 - h. Relays.
 - i. Patch panels, and the termination positions within the patch panels.
 - 2. Labels shall coincide with device IDs used on the record drawings.
 - 3. Degrease and clean surfaces to receive nameplates and labels
 - 4. Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using machine screws.
- B. Equipment Enclosures:
 - 1. Label SEC and CEC enclosures associated with the security system with a nameplate.
 - 2. Mount label on exterior of door, centered horizontally, and positioned one-third of the door height vertically from the top.
 - a. Color: Green background with White lettering.

3. Example:

- a. Line 1: "SEC-01" in 1/2 inch high letters.
- b. Line 2: "Security Equipment Enclosure" in 1/4 inch high letters.

C. Conduits:

1. Write the destination for every conduit entering a junction box, SEC, and CEC enclosure, or wireway using a black permanent ink marker next to the conduit inside the box.
2. Example: "To SEC-01."

D. Security Devices:

1. Label devices associated with the security system with a permanent machine generated, laminated, label. Use 12 point Helvetica text with a clear background. Use white or black lettering depending upon the color of the device.
2. Label each device in a concealed location with the system point number and address.

E. Batteries:

1. Label power supply batteries with the month and year they were installed.
2. Example: "April 2004."

F. Wire and Cable:

1. Identify wire and cable clearly with permanent machine-generated labels wrapped about the full circumference within one (1) inch of each connection.
2. Indicate the cable ID designated on the associated field or shop drawings or run sheet, as applies.
3. Assign wire or cable designations consistently throughout a given system; i.e., each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.
4. Provide labels where wire and cable first enter and exit from conduit, junction or distribution boxes; locate labels within six (6) inches of the point of exit.
5. Positional labels so they are clearly visible without the need to remove wire management or any other obstructions.
6. Label cables at both ends of a run and within all pull and junction boxes using machine generated wrap-around labels.
7. See Item Part 3 "Cable Label Format" for examples.

G. Equipment Racks:

1. Provide one label plate per rack. Permanently affix label plate and center the label plate on the rack's front top angle.
2. Example: "SECURITY RACK 01."

H. Terminal Blocks.

I. Relays.

J. Patch Panels:

1. Label individual ports on the patch panels.
2. Example: "V01 V02 V03 ..."

3.02 CABLE LABEL FORMAT

A. From Panel to Field Device:

1. Line 1: Device Type and Device Number.
2. Line 2: Panel ID – Port Number.
3. Example: "K 001
DVR 2 -5."
4. Standard Device Types:
 - a. CR = Card Reader.
 - b. K = Camera.
 - c. IC = Intercom Reader.
 - d. R = Relay Output.
 - e. A = Alarm Point.

B. Miscellaneous Examples:

1. From Power Supply to Camera: "K001
PWR 24 VAC"

C. Communications Cable

1. Line 1: Communication Type and Direction.
2. Line 2: Panel ID.
3. Example: "RS485 TO
PANEL 2"
4. Typical Communication Types:
 - a. 100BASE-T
 - b. RS 485
 - c. RS 232
 - d. RS 422
 - e. SNET
 - f. 20mA

END OF SECTION 13780

SECTION 13790

SECURITY SYSTEM COMMISSIONING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK

- A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, and transportation required to test a completed security system installation as described in these specifications.
- B. Base Bid Work
 - 1. Full testing of a completed security system which includes:
 - a. A complete pretest of the security system.
 - b. A final walk test with the Engineer and/or Owner.
 - c. Test Results Record Documentation.
- C. Related Sections:
 - 1. Section 13700 Basic Security Requirements: for submittal format.

1.03 SUMMARY OF SYSTEM COMMISSIONING ACTIVITIES

- A. Overview
 - 1. The purpose of system commissioning is to ensure the security system operates properly when it is needed most. Security systems are very complex from both an equipment and programming standpoint, and thorough testing is necessary to ensure correct operation.
 - 2. Perform testing activities after-hours or on weekends when the system is “quiet” and the building is generally unoccupied. This will minimize the amount of irrelevant activity in the system activity reports that will be used as a record of the pre and final test results.
- B. Pre-Test
 - 1. Perform a 100% pre-test of system aspects to verify correct operation prior to scheduling the final test. The pre-test will help to make the final test run smoothly when demonstrating the system’s operation to the Owner and Engineer.
 - 2. Document the results of the pre-test using the approved test forms and shall submit a copy to the Engineer along with the system activity reports
- C. Final Test
 - 1. Perform a final test of the system in the presence of the Engineer and/or Owner to demonstrate correct operation of the security system.

1.04 SUBMITTALS

- A. Operation and Maintenance Manuals: Submit the following for review and comment at the completion of the project:
1. Functional Design Manual: Includes a detailed explanation of the operation of the system.
 2. Hardware Manual which includes:
 - a. Pictorial parts list and part numbers.
 - b. Pictorial and schematic electrical drawings of wiring systems, including devices, control panels, instrumentation and annunciators.
 - c. Telephone numbers for the authorized parts and service distributors.
 - d. Include service bulletins.
 3. Software Manual which includes:
 - a. Use of system and applications software.
 - b. Initialization, start-up, and shut down procedures.
 - c. Alarm Reports
 4. Operator's Manual which fully explains procedures and instructions for the operation of the system and includes:
 - a. Computers and peripherals.
 - b. System start up and shut down procedures.
 - c. Use of system, command, and applications software.
 - d. Recovery and restart procedures.
 - e. Graphic alarm presentation.
 - f. Use of report generator and generation of reports.
 - g. Data entry operator commands.
 - h. Alarm messages and reprinting formats.
 - i. System access requirements.
 5. Maintenance Manual which includes:
 - a. Instructions for routine maintenance listed for each component, and a multi-page summary of component's routine maintenance requirements.
 - b. Detailed instructions for repair of the security system.
 - c. A summary of the software licenses, including license numbers, quantity of clients, summary of the software options provided and database capabilities.
 - d. A summary of the TCP/IP address used and which system component they are associated with. Include the gateway address, subnet mask, DNS server, and host name information.
 6. Test Results Manual, which includes the document results of tests, required under this Specification, organized by System, Floor, and Door.
 7. Record Drawings Manual which includes 11"x17" prints of record drawings as described below.

- B. Record Drawings: Submit the following for review and comment at the completion of the project:
1. Drawings shall fully represent installed conditions including actual locations of devices, actual cable and terminal block numbering, and correct wire sizing as well as routing. Record changes in the work during the course of construction on blue or black line prints.
 2. Record drawings shall include drawings submitted as part of the Shop Drawing package, plus additional information required to accurately document installed conditions.
 3. Record drawings shall include the following additional information:
 - a. Device addresses & IP address information.
 - b. Settings for each camera (lens specs, mm setting, auto shutter setting, and other available camera settings, etc.)
 4. Final acceptance will not be made until the Engineer approves the record drawings.

1.05 QUALITY ASSURANCE

- A. Provide a project manager to coordinate the security system commissioning work with other trades.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SCHEDULING

- A. Coordinate security commissioning with the General Contractor, and provide specific information on pre-test and final-testing activities to be entered into the overall project construction schedule.

3.02 TESTING REQUIREMENTS

A. Site Tests

1. Perform a 100% pretest of the system prior to final testing by the Engineer. Provide the Engineer with a minimum of a 5 day notice prior to scheduling testing.
2. At the conclusion of the work on a floor, test the system on that floor to verify proper operation and reporting of devices.
3. Work with the door hardware supplier to resolve electric hardware failures and door alignment/closure problems.
4. At the completion of the work, test the entire system to verify proper operation. These tests shall include:
 - a. CCTV Recording System Test: Test the recording system for correct programming, alarm recording, and event retrieval. Verify correct integration with the ACAMS system for alarm call-up. Test and verify

- CCTV system viewable from Dispatch monitors.
- b. CCTV Camera Test: Review cameras for proper coverage, quality of video, etc.

B. Test Preparation

1. Provide device identification numbers that differ from or were not included on the original contract drawing set.
2. Provide a complete systems point list.
3. Provide paper and toner for the printer so that an event log can be printed out and attached to the test reports as verification of test sequence and systems response.
4. During testing, provide a minimum of three technicians familiar with the installation to assist with the test. Stage the technicians as follows: one at the host, one at the device being tested, and one runner responsible to furnishing tools, step ladders, etc.
5. Provide radios for use by the Engineer and Owner during testing.
6. Provide pre-programmed access cards for use during testing. Provide one card for each access level.

3.03 TEST PROCEDURES

- A. Refer to the test forms for testing procedures for each type of device/system.

3.04 DOCUMENTATION

- A. Provide a service log on the inside door of each power supply. Service log shall include columns for the following information: date of service, description of work performed, service technician(s), service company. Place the service log inside a separate clear plastic pocket affixed to the inside door of the power supply.

3.05 DEMONSTRATION

- A. On completion of the acceptance test, instruct the owner's representatives, at a time convenient to them, in the operation and testing of the system.
- B. Utilize the database for the project during training to give the users a project specific example to learn from.
- C. Provide a minimum of 4 hours of on-site training for the Surveillance system by a factory-trained representative. Conduct separate training sessions for system administrator, system supervisor, and operator level users.
- D. Maintain a sign in sheet with names and dates of all persons trained and forward to University's Representative upon completion of training.
- E. Provide for two Owner's representatives to attend factory certification training (off-site) for the Access Control System.

END OF SECTION 13790

SECTION 13930

FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Furnish and install Automatic wet pipe sprinkler system; include:
 - 1. Design and install wet-pipe sprinkler systems for the Maintenance Building. Design shall include all required Hydraulic calculations.

1.03 RELATED SECTIONS

- A. Section 01330 - Submittal Procedures

1.04 REFERENCES

- A. NFPA 13 - (2002) Installation of Sprinkler Systems.
- B. NFPA 25 - (2002) Inspection, Maintenance and Testing of Water-Based Fire Protection Systems.
- C. NFPA 14 - (2003) Standpipe and Hose Systems
- D. Uniform Building Code - (2001 Edition with latest California (CA) amendments)
- E. Uniform Fire Code - (2001 Edition with latest CA amendments)

1.05 SYSTEM DESCRIPTION

- A. System to provide complete sprinkler and standpipe coverage per codes listed above. If a conflict exists the most restrictive requirement(s) shall be used in the design.
- B. Provide system in accordance with occupancy classification and general layout as shown on drawings.

1.06 SUBMITTALS

- A. Submit complete shop drawings, product data, design and hydraulic calculations to authority having jurisdiction (AHJ) and Engineer for approval. Shop drawings shall contain all items required by NFPA 13 and NFPA 14. Incomplete drawings will be rejected. Obtaining the approval of the AHJ shall be included in the scope of work. Submit review set to the Engineer concurrent with the submittal to the AHJ. Submit proof of AHJ approval to the Engineer.
- B. Shop drawings shall include detailed pipe layout, hangers, supports, components, and accessories. Shop drawings shall also include the coordinated locations of all lights

and HVAC diffusers. The Contractor shall verify, in writing, at the time of submittal that the information shown has been reviewed and approved by the mechanical and electrical sub-contractors.

- C. Provide operation and maintenance manuals in quantities and format as specified in Section 01330 - Submittal Procedures. Maintenance Manuals shall include the applicable forms from NFPA 25 along with a recommended maintenance schedule as well as written maintenance procedures for recommended maintenance. Operation manuals shall include reduced size drawings of system, copies of the hydraulic calculations and hydraulic name plate, UL listing information for all components of the system, catalog cut sheets for all system components, a written sequence of operations for the system, copies of the systems acceptance forms from NFPA 13 and 14, copies of all warranties and guarantees, copies of the completed and signed off City sprinkler inspection card and copies of the final certificate of occupancy. All copies of documents shall be legible. Provide typed instructions relative to the operation of the sprinkler controls. Encase instructions in metal frame with Lucite cover and mount at the riser location.

1.07 QUALITY ASSURANCE

- A. Design and installation shall conform to the requirements of NFPA 13 and 14 and the Uniform Building Code and Fire Code. See section 1.3, References, for code edition.
- B. Equipment and Components: Shall Be UL listed or FM approved for fire protection service.
- C. Specialist Firm: The automatic wet pipe sprinkler contractor shall be a California State licensed (C-16) company specializing in the design and installation of sprinkler systems.

1.08 REGULATORY REQUIREMENTS

- A. All "For construction" drawings, hydraulic calculations and product data shall include the stamp of approval of the authority having jurisdiction.

1.09 EXTRA STOCK

- A. Provide extra sprinkler heads per the provisions of NFPA 13.
- B. Provide suitable wrenches for each head type.
- C. Provide and install metal storage cabinet in location designated by the Engineer.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Provide pipe material per NFPA 13 and 14.

2.02 SPRINKLER HEADS

- A. Office areas: (Areas with hard or drop ceilings): Semi-Recessed Pendant Sprinkler Heads. Sprinkler and Escutcheon finish color to be white.

- B. Non-Office areas (Areas without hard or drop ceilings): Pendant, Upright or Sidewall Sprinkler Head (with BRZ or CHRM finish) and head guard if sprinkler deflector is within 15 feet of the floor.
- C. Manufacturers
 - 1. Reliable
 - 2. GEM
 - 3. Viking
 - 4. Or equal.

2.03 ACCESSORIES

- A. Provide all accessories to achieve a complete working system, including, but not limited to, flow switches and tamper switches. Electrical connection to fire alarm systems by Fire Alarm Contractor.
- B. Provide and install an engraved hydraulic nameplate with the information required by NFPA 13. Plate shall have minimum 1/8 inch white letters on red background.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate work of this section with other affected work. Use reflected ceiling plans; mechanical plans, structural plans and electrical lighting plan to avoid conflicts with lights, ducts, piping or structure.

3.02 INSTALLATION

- A. Piping system shall include flexible couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints and other features in accordance with NFPA 13 and 14 for protection of piping against damage from earthquakes.
- B. Place exposed piping above bottom cord of bar joists, unless shown otherwise on Drawings.
- C. Place pipe runs to minimize obstruction to other work.
- D. Place piping in concealed spaces above finished ceilings.
- E. Apply strippable tape or paper cover to ensure sprinkler heads do not receive field paint finish.
- F. Provide drain valves at system low points.
- G. The locations of the sprinkler heads shall be coordinated with the mechanical and electrical sub-contractors so as to avoid conflicts among sprinkler heads, lights, and diffusers.

- H. Coordinate locations of piping and sprinkler heads in covered parking areas to maintain clearances required for passage of vehicles. For minimum clearances see architectural drawings.
- I. Coordinate locations of piping and sprinkler heads in maintenance and fuel/wash areas to maintain clearances required for passage of vehicles and to coordinate with equipment.

3.03 FIELD QUALITY CONTROL

- A. Hydrostatically test sprinkler systems in accordance with NFPA 13 and 14. Check system for leakage at joints. Measure hydrostatic pressure at low point of each system or zone being tested.

3.04 CLEANING

- A. Flush entire piping system of foreign matter in accordance with NFPA 13. Flushing shall continue until water is clear.

END OF SECTION 13930

SECTION 14240

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hydraulic, holeless passenger Elevator #1 maintenance building, 2 stops, bottom stop at ground level
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Division 4 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry.
 - 3. Division 5 Section "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Divider beams.
 - c. Structural-steel shapes for subsills.
 - d. Pit ladders.
 - 4. Division 9 Section "Linoleum Floor Coverings" for finish flooring in elevator cars.
 - 5. Division 13 Section "Fire Alarm" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.
 - 6. Division 13 Section "Basic Security System Requirements" for security card access equipment used to restrict elevator use.
 - 7. Division 16 Section "Premises Telephone Wiring" for telephone service to elevators.
 - 8. Division 16 Sections for electrical service for elevators to and including disconnect switches at machine room door and standby power source, transfer switch, and connection from auxiliary contacts in transfer switch to controller.

1.03 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.04 SUBMITTALS

- A. **Product Data:** Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. **Shop Drawings:** Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. **Samples:** For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- square samples of sheet materials; and 4-inch lengths of running trim members.
- D. **Manufacturer Certificates:** Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- E. **Maintenance Manuals:** Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.
- F. **Inspection and Acceptance Certificates and Operating Permits:** As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.05 QUALITY ASSURANCE

- A. **Installer Qualifications:** Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. **Regulatory Requirements:** In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."
 - 1. **Seismic Risk Zone:** Project is located in Zone 3 or greater.
- C. **Accessibility Requirements:** In addition to requirements of authorities having jurisdiction, comply with the more restrictive requirements of both "California Disabled Accessibility Guidebook 2000" (CalDAG 2000) and the Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)"

1.06 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Furnish well casing and coordinate delivery with related excavation work.

- C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.07 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.
 - 1. Warranty Period: 12 months from date of Substantial Completion.

1.08 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: Two hours or less.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hydraulic elevators that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Dover Elevator Systems.
 - 2. Fujitec America, Inc.
 - 3. Montgomery KONE Inc.
 - 4. Otis Elevator Co.
 - 5. Schindler Elevator Corp.
 - 6. Thyssen Elevator Group North America.

2.02 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.

- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide either of the following:
1. Pump, with fan-cooled squirrel-cage induction motor, mounted on top of oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch-thick, glass-fiber insulation board.
 2. Submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts.
 3. Provide motor with wye-delta or solid-state starting.
 4. Provide variable-voltage variable-frequency motor control.
- C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
1. Provide dielectric couplings at plunger/cylinder units.
 2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
- F. Protective Cylinder Casings: PVC pipe casings complying with ASME A17.1, of sufficient size to provide not less than 1-inch clearance from cylinder, and extending above pit floor.
- G. Corrosion Protective Filler: A solventless, petroleum-based gel formulated for filling the space between hydraulic cylinders and protective casings. Filler is heavier than water, electrically nonconductive, and liquefies at approximately 150 deg F.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Diversified Enterprises; No-Ox-Id R-R #6110A.
 - b. Pacific Standard Chemical Co.; Union-Gard 160.
- H. Car Frame and Platform: Welded steel units.
- I. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 6, nondirectional satin finish.
 2. Enameled-Steel Sheet: Cold-rolled steel sheet complying with ASTM A 366/A 366M, matte finish, stretcher-leveled standard of flatness; hot-rolled steel sheet complying with ASTM A 569/A 569M may be used for door frames. Provide

- with factory-applied enamel finish; colors as selected by Architect.
3. Prime-Painted Steel Sheet: Cold-rolled steel sheet, ASTM A 366/A 366M, or hot-rolled steel sheet, ASTM A 569/A 569M, with factory-applied rust-inhibitive primer.
 4. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications; color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range of products.

2.03 OPERATION SYSTEMS

- A. Passenger Elevators: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.
 1. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
 1. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. Only one car may be moved upward at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, each of a preselected length of time, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at fire command station. Manual operation causes automatic operation to cease.
 2. Standby Powered Lowering: On activation of standby power, cars are lowered to the lowest floor, open their doors, and shut down.
 3. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.
- C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
 1. Keyswitch Feature: Car and hall push buttons are activated and deactivated by security keyswitches. Key is removable only in deactivated position.
 2. Secured Landing Feature: Allows each landing to be secured or cleared. If landing is secured, car buttons for that landing do not register a call unless landing access code is entered within a predetermined time period after landing button is pressed. When a secured landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered or predetermined time period has elapsed.
 - a. Access codes are programmed at each car operating panel using a security keyswitch. Secured landing feature is activated and deactivated by a security keyswitch at the main landing.
 3. Car-to-Lobby Feature: Feature, activated by a keyswitch at main lobby, that causes all cars in a group to return immediately to lobby and open doors for

- inspection. On deactivation by keyswitch, cars complete calls registered before keyswitch activation and resume normal operation.
4. Card-Reader Operation: For access to restricted landings. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space in car as indicated for card reader.
 - a. When system is activated, car calls to restricted landings do not register until card is accepted by security access system. Security access system determines which landings are restricted and which of those are accessible to cardholder.
 - b. Card readers and other security access system equipment are specified in Division 13 Section "Basic Security System Requirements."

2.04 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, nonyellowing translucent plastic.
- B. Car Control Stations: Provide manufacturer's standard semirecessed car control stations. Mount in return panel adjacent to car door, if not otherwise indicated.
- C. Car Control Stations: Provide fully recessed car control stations with applied metal faceplates. Mount in return panel adjacent to car door, if not otherwise indicated.
- D. Swing-Return Car Control Stations: Provide car control stations fully recessed in hinged return panel adjacent to car door.
 1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
 2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
 3. Mount controls at heights complying with with the more restrictive requirements of both "California Disabled Accessibility Guidebook 2000" (CalDAG 2000) and the Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
- E. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- F. Fire Department Communication System: Provide flush-mounted cabinet in each car and required conductors in traveling cable for fire department communication system specified in Division 16 Sections.

- G. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
1. Include travel direction arrows if not provided in car control station.
- H. Hall Push-Button Stations: Provide hall push-button stations at each landing for each elevator or group of elevators as indicated.
1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.
- I. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.
1. Provide units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
 2. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches above finished floor.
 3. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - a. At manufacturer's option, audible signals may be placed on each car.
- J. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.
1. Integrate ground-floor hall lanterns with hall position indicators.
- K. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

2.05 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

2.06 PASSENGER ELEVATOR CAR ENCLOSURES

- A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.
1. Floor finish is specified in another Section.
 2. Metal Wall Panels: Flush hollow-metal construction, fabricated from metal indicated.
 3. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch fire-retardant-treated particleboard with plastic-laminate panel backing complying with NEMA LD 3, Type BKV and manufacturer's standard protective edge trim.

Panels have a flame-spread rating of 25 or less, when tested according to ASTM E 84.

4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
7. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
8. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic complying with flammability requirements.
9. Handrails: Manufacturer's standard handrails, of metal indicated.

2.07 PASSENGER HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
 1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
 1. Stainless-Steel Frames: Formed stainless-steel sheet.
 2. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
 3. Sills: Extruded metal, with grooved surface, 1/4 inch thick..
 4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.08 PASSENGER ELEVATOR

- A. Elevator No. #1:
 1. Type: Holeless, telescoping, beside-the-car, dual cylinder.
 2. Rated Load: 3500 lb.
 3. Rated Speed: 100 fpm.
 4. Operation System: Selective collective automatic operation.
 5. Auxiliary Operations:
 - a. Standby power operation.
 - b. Standby powered lowering.
 - c. Battery-powered lowering.
 - d. Independent service.
 - e. Loaded-car bypass.
 - f. Automatic dispatching of loaded car.
 - g. Nuisance call cancel.
 6. Security Features: Card-reader operation.
 7. Car Enclosures: As follows:
 - a. Inside Width: 80 inches.
 - b. Inside Depth: 51 inches.

- c. Inside Height: 94 inches minimum.
 - d. Front Walls: Satin stainless steel with integral car door frames.
 - e. Car Fixtures: Satin stainless steel.
 - f. Side and Rear Wall Panels: Plastic laminate.
 - g. Reveals: Enameled steel.
 - h. Door Faces (Interior): Satin stainless steel.
 - i. Door Sills: Aluminum.
 - j. Ceiling: Luminous ceiling.
 - k. Handrails: Satin stainless steel, at side and rear walls.
 - l. Floor prepared to receive sheet linoleum (specified in Division 9 Section "Linoleum Floor Coverings").
8. Hoistway Entrances: As follows:
- a. Width: 42 inches.
 - b. Height: 84 inches.
 - c. Type: Single-speed side sliding.
 - d. Frames: Satin stainless steel.
 - e. Doors: Satin stainless steel.
 - f. Sills: Aluminum.
9. Hall Fixtures: Satin stainless steel.
10. Additional Requirements: As follows:
- a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
 - b. Provide protective blanket hooks in car and one complete set of full-height blankets.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.02 INSTALLATION

- A. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating

mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.

- D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.
- E. Lubricate operating parts of systems as recommended by manufacturers.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- G. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.03 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.04 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.05 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
 - 1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.
 - 2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage

elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

END OF SECTION 14240

SECTION 14450

VEHICLE LIFTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:
 - 1. 5600 Lift, in-ground, general (Ref. Part 2.01)
 - 2. 5641 Lift, axle, 2 post, 50,000 pounds, with shutter plates (Ref. Part 2.02)
 - 3. 5751 Lift, parallelogram, 50,000 pounds, 32' (Ref. Part 2.03)
- B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.
- C. Piping, wiring, and switching between equipment and utilities.

1.03 QUALITY ASSURANCE

- A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.
- B. Quality standards shall meet or exceed ISO-9001.
- C. Manufacturer's Representative:
 - 1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out, and start up.
 - 2. Training: Provide technical representative to provide training to Owner's maintenance personnel in operation and maintenance of specified equipment.
 - 3. Quality standards shall meet or exceed ISO-9001.

1.04 SUBMITTALS

- A. Product Data: Submit Product Data in accordance with Division 1 of these specifications.
- B. Operations and Maintenance Manual:
 - 1. Provide complete parts, operating, and maintenance manual covering equipment at time of installation.
 - 2. Description of system and components.
 - 3. Engineered floor plan drawings with a detailed equipment layout.
 - 4. Schematic diagrams of electrical, plumbing, and compressed air systems.
 - 5. Manufacturer's printed operating instructions.
 - 6. Printed listing of periodic preventive maintenance items and recommended

frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

7. List of original manufacturer's parts, including suppliers' part numbers and cutsheets, recommended spare parts stock quantity, and local parts and service source.
8. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Fold out diagrams and illustrations are acceptable. Manual to be reproducible by dry copy method. Provide copies per provisions of Division 1.

C. Shop Drawings: Submit Shop Drawings in accordance with Division 1.

1.05 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.
- C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish. Defects shall not include damage due to neglect, misuse, or situations resulting from non-performance of a manufacturer's recommended preventive maintenance schedule.
- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.
- E. All parts shall be readily available locally in the United States.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.

1.08 LABELING

- A. Manufacturer shall securely attach in a prominent location, on each major item of equipment, a non-corrosive nameplate showing manufacturer's name, address, model

number, serial number, and pertinent utility or operating data.

- B. Manufacturer shall securely attach the ALI label of the Automotive Lift Institute.
- C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (UL) in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 - PRODUCTS

2.01 LIFT, IN-GROUND, GENERAL Equipment Identifier: 5600

A. Manufacturer's Reference:

- 1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Rotary Lift, Madison, IN (812) 273-1622
 - b. Model numbers shall be as specified
- 2. Alternate manufacturers: *Contingent upon compliance with these specifications* and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers *may* be considered as equal.

B. Features/Performance/Construction:

- 1. Plunger and casing assembly:
 - a. Each post shall be equipped with a manual air bleeder and a control orifice to insure controlled speeds during up and down cycles.
 - b. Lowering speed shall not exceed 20 FPM under any circumstance, with or without load to full rated capacity.
 - c. Unloaded jack plungers shall return to fully lowered position. If ballasting is required, lead shot or steel scrap punchings (protected against corrosion with 90-weight oil) shall be used. Jacks shall be complete with one-piece combination packing and wiper assembly not requiring adjustment or lubrication.
 - d. Jack plungers shall be manufactured of seamless steel pipe, turned and polished over entire surface, with positive stops to prevent overextension. Plunger shall be removable for inspection and/or replacement.
 - e. Outer casings shall be steel pipe with electrically welded bulkheads and flanges.
 - f. The bearing liners shall be made of UHMWPE and shall be designed to snap in position at the top and bottom of the guide. The bearing liner shall provide minimum plunger to bearing friction for smooth operation. Bearing span for eccentric loaded plungers shall not be less than 34 inches. Bearing span for center loaded plungers shall not be less than 21-1/2 inches.
 - g. Jacking units shall be hydrostatically tested at a working pressure of 400 PSI and shall not leak at this pressure.

2. Locking legs: All lifts shall be provided with multi-position locking legs.
 - a. Front and rear lock legs shall be rated at same capacity as the corresponding jacking units.
 - b. The legs shall be of the telescoping type and constructed of 3" x 4" rectangular tubing and a minimum wall thickness of 3/16 inch to prevent strut rotation out of alignment with locking latch. Round-notched struts are not acceptable. Each strut shall have a 1/2 inch steel plate welded to it with a minimum of 18 locking slots spaced at 3 inch increments.
 - c. The locking latches shall be spring loaded to the locked position and shall be released at the control location. The lift locking leg shall be attached to the saddle to prevent rotation insuring proper location of releases at all times. The locking leg shall prevent rotation of the piston assembly.

3. Superstructure saddle and adapters:
 - a. Superstructures shall be designed to prevent rotation horizontally. Superstructures, which recess into floor frames, shall fit squarely within frames and shall not come in contact with floor frames.
 - b. Front saddle and adapters:
 - 1) Saddle and adapters shall be so designed to provide width (spread) adjustment without necessity of operator bodily getting under vehicle. Use of extension handles, is acceptable if use does not require undue agility or manipulation.
 - 2) Adapter shall be restrained to prevent accidental excessive extension. When front post is in the fully lowered position the saddle and adapter assembly shall recess into a pocket provided in the frame.
 - c. Rear saddle and adapters: Design shall be such as to allow the saddle and the two removable adapters to recede beneath the floor level and allow floor level cover plates to be closed over same when the unit is lowered.

4. Wheelbase adjustment:
 - a. Where applicable, lifts shall be supplied with all components required for the wheelbase adjustment ranges as shown and specified.
 - b. Hydraulic wheelbase adjustment mechanism shall be designed to position movable jack of adjustable lift models fore and aft to desired wheelbase setting.
 - c. Adjustment shall be accomplished by means of a hydraulic motor operated by oil supplied from lift power unit.
 - d. Hydraulic motor shall drive chain and sprocket mechanism to move front jack and cover plates to desired setting. Hydraulic motor shall have bypass valve to prevent damage from overload conditions.
 - e. The hydraulic motor shall be controlled by a four-way directional control valve, located in the same floor recess as lift control valves.
 - f. Drive torque motor shall be rated at a minimum 376 pounds per inch and shall be connected to a sprocket on drive shaft by a permanently lubricated roller chain.
 - g. Wheelbase adjustment control valve shall provide forward and reverse positions with spring return to open position.

C. Controls:

1. Lift control valves:

- a. Unless otherwise specified, controls shall be located in a suitable control box on the specified side of the front frame at the extreme front at an adequate lateral distance from the center line of the main frame to permit operation without interference from the vehicle or its front overhang at the locations shown on the plans.
- b. The hydraulic control valve shall be of composite design providing individual or simultaneous control of front and rear plungers.
- c. The operating push buttons shall be surface mounted to provide operation without opening a cover plate or door and suitably protected against damage by accidental drive over of a capacity size vehicle. Oil control valves shall be "deadman" type.
- d. Valve cores and seals shall be arranged so that they may be serviced or replaced without removing valve body from control box.
- e. All valves shall be rated for 400 PSI minimum. Shop drawings for valves are mandatory and shall be submitted as specified in Division 1 – General Requirements.
- f. The lift installer shall provide piping from control valves to jacks and mounting valves.

2. Lift power unit controls:

- a. Refer to lift specifications for motor starter and pushbutton station requirements.
- b. Wiring and connections from starter to remote pushbutton stations shall be furnished under Division 16 – Electrical.
- c. Switching and other electrical controls shall meet applicable National Electrical Code requirements.

D. Finish:

1. All lifts and lift power units shall be painted with manufacturer's standard paint process and color.
2. Where an option exists, base color for above equipment and all other items in this Section shall be selected by Owner's Representative.

E. System shall be filled with new hydraulic oil as recommended by manufacturer. Each lift shall be tested with a vehicle (furnished by Owner). Lift manufacturer and/or installer shall leave the following with the Owner.

1. Fifty-five gallons of hydraulic fluid for each power unit reservoir.

2.02 LIFT, AXLE, 2 POST, 50,000 POUNDS, WITH SHUTTER PLATES
Equipment Identifier: 5641

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.

- a. Rotary, Madison, IN (812) 273-1622
 - b. Model: RU70Q and Power Unit P841
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.*

B. Capacities/Dimensions:

1. Hydraulic lift:

a. Lift capacities:

- 1) Front: 25,000 pounds
- 2) Rear: 25,000 pounds
- 3) Total: 50,000 pounds

b. Lift rise:

- 1) Front: 66 inches
- 2) Rear: 69 inches

c. Plunger diameter:

- 1) Front: 10-5/8 inches
- 2) Rear: 10-5/8 inches

d. Adjustable adapters spread and retract:

- 1) Front: 57-3/4 inches (maximum) and 40-1/4 inches (minimum)
- 2) Rear: 24-3/4 inches (maximum) and 39-3/4 inches (minimum)

e. Wheel base range: 154 to 338 inches

f. Distance from rear jack centerline to home pocket: 295 inches

2. Power unit:

- a. Motor: 10 HP, explosion proof
- b. Pumps: 2 each, 20 gallons per minute
- c. Hydraulic fluid displacement: 85 gallons
- d. Overall dimensions:
 - 1) Width: 32-1/4 inches
 - 2) Depth: 15-7/16 inches
 - 3) Height: 47-15/16 inches

C. Features/Performance/Construction:

1. Front and rear superstructures shall be saddle type with axle engaging supports laterally adjustable to handle various suspension systems. Design shall provide width adjustment without necessity of operator physically getting under the vehicle.
2. Front post saddle and adapter shall recess into a pocket provided in the frame when in the fully lowered position.

3. A *minimum of two sets* of superstructure adapters shall be furnished for each lift to *properly engage pick-up points* of the *transit buses* operated or currently on order by Owner having a wheel base within specified range.
4. Front post, consisting of the carriage and trench, shall be equipped with permanent lubricated bearing wheels rolling in rolled channel tracks. The channel tracks will be essentially flush with the floor surface. Cover plates shall move with the carriage so as to keep the trench opening covered at all times. Cover plates will be of sufficient strength to support a wheel loading of one quarter of the design capacity without permanent deformation.
5. Rear superstructure shall recess into housing and be covered automatically to provide an unobstructed floor area when fully lowered. The rear post shall be suspended in a concrete vault. The rear vault shall be connected to the front trench to provide full access between the front and rear post. A removable cover plate for pit access shall be provided.
6. Wheel base adjustment shall be achieved by moving front post by means of a hydraulic motor.
7. Front and rear adapters shall be adjustable so that they will provide a spread and retract of 57-3/4 inches (maximum) and 40-1/4 inches (minimum) for the front and 24-3/4 inches (maximum) and 39-3/4 inches (minimum) for the rear.
8. The rear frame unit shall provide integral wheel chocks at floor level when the unit is lowered.
9. Recessed track assembly, necessary attachments, and assembly hardware shall be provided by manufacturer.
10. Front and rear locking legs shall be rated at the same capacity as the corresponding jacking units. The legs shall be of the telescoping type and equipped with locking latches that automatically lock at 3 inch increments providing a minimum of 18 locking positions. Release of locks to be accomplished by constant pressure air valve located at control box.
11. Lift lock leg shall be attached to saddle to prevent rotation of piston assembly, therefore preventing bypass of stop lugs in cylinder assembly.
12. All plumbing components shall be supplied by installing contractor.
13. The power unit shall be located within the lift trench, mounted to the side wall.
14. Power unit shall be configured of geared pumps and a common motor assembly, complete with relief valves, and check valves mounted on an appropriately sized hydraulic fluid reservoir. The motor shall be explosion proof and be directly coupled to the pumps with a common shaft/coupling arrangement.
15. Power unit pumps shall provide hydraulic pressure to raise or lower any combination of the jacking units within the lift system simultaneously synchronized to within plus or minus one inch of each other throughout their full stroke. Equalization of the rate of lifting or lowering of jacking units shall be automatically controlled by the pumps and actual or arrangements so that the operator will not be required to make any adjustments during operation.
16. Power unit shall be equipped with a magnetic motor starter. Magnetic motor starter shall be a full voltage, 3 pole, reversing magnetic type for 3 phase, 60 cycle motor control with manual reset and "UP/DOWN/STOP" push-button in cover. Magnetic motor starter shall be enclosed in a NEMA 1 enclosure and wall mounted.

- D. Controls: Jacks shall be operated from control box recessed in floor as described in Lift, In-Ground, General (Ref. Part 2.01). The hydraulic control valve will be of composite design providing individual or simultaneous control of front and rear plungers. The valve will be located in a suitable control box on the specified side of the front frame at the extreme front at an adequate lateral distance from the center line of the main frame to permit the operation without interference from the vehicle or its

front overhang.

E. Utility Requirements:

1. Air: 1/2 inch, 90 PSI; 2 CFM
2. Electrical: 460 VAC, 3 phase, 10 HP

2.03 LIFT, PARALLELOGRAM, 50,000 POUNDS, 32 FEET
Equipment Identifier: 5751

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Rotary Lift, Madison, IN (812) 273-1622
 - b. Model: 50/32 (surface mounted)
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers may be considered as equal.*
 - a. Steril Koni, Stevensville, MD (410) 643-9001

B. Capacities/Dimensions:

1. Lift capacity: 50,000 pounds
2. Lift dimensions:
 - a. Platform length: 32 feet
 - b. Platform width: 31 inches (maximum)
 - c. Spacing between platforms: 45 inches (maximum)
 - d. Overall width: 105 inches (maximum)
 - e. Horizontal movement (from collapsed to fully raised position): 51 inches (maximum)
 - f. Collapsed height: 13 inches (maximum)
3. Minimum lifting height of a flush mounted unit from finished floor level to bottom of tires: 63 inches, minimum. Lifting unit shall permit lifting of vehicle to any height up to its full amount with a minimum of 10 locking positions distributed throughout the lift's travel.

C. Features/Performance/Construction:

1. Complete lift assembly shall consist of an electro-hydraulic lift unit, control console, and specified accessories.
2. Control console shall be connected by required lengths of steel hydraulic pipe or steel reinforced hydraulic hose, compressed air line, and electrical cable permitting location 10 feet (minimum) from the connections on the lift unit including standard fittings throughout. All hydraulic hoses on lifting structure shall be of steel reinforced construction and have standard fittings throughout. All conduit from console to lift shall be located in slab.

3. Support leg assembly:
 - a. Base of each lifting member shall be pre-drilled to accept anchoring bolts adequately sized for the loads imposed during lift operation.
 - b. Each hydraulic cylinder shall be mounted on the underside of the lifting platform and have a flow check integrally mounted to prevent collapse in the event of a major fluid leak.
4. Platform:
 - a. Each platform shall be constructed on 0.375 inch thick plate steel supported by 0.250-inch thick steel "I" beams.
 - b. Each platform shall have two automatic swing wheel chocks mounted to the front and rear of the lift to prevent a vehicle from rolling off the platform when raised more than 12 inches. Chocks shall not reduce the effective length of lifting platforms by more than 6 inches.
5. Hydraulic gear pump, driving lift, shall be capable of supplying the appropriate PSI and GPM to operate, and be capable of being lowered from any raised position by operation of manual pump and valving system.
6. Safety features:
 - a. Safety locks with a safety factor of not less than 3:1 shall be mounted one set to each lifting cylinder, engaging as the lift ascends, and shall allow the lift to be locked at a minimum of 10 different levels ensuring minimal travel due to a hydraulic fluid leak.
 - b. Safety locks shall be automatically disengaged when the lift "Lower" control is operated, and automatically re-engaged when the lift "Lower" control is released.
 - c. Lift shall have full-length continuous safety bar mounted to the lower surface of the main lifting platform and coupled to the control system. Safety bar will be located on the inside and the outside of both platforms. The lift will stop and lock out the operator.
 - d. Equalization mechanism shall ensure that the individual lifting platforms differ in height by no more than two inches.

D. Controls:

1. Control console shall house an oil reservoir, suction strainer, low pressure return filter, hydraulic gear pump, manual pump, NEMA 12 rated (minimum) electrical enclosure for system disconnect, "Raise/Lower" and "Press to Lock Lift" controls, and "Power-On" and "Operator Lock-Out" pilot lamps.
2. Control system shall be able to be programmed to stop a lift at a specific height in order to load or unload any accessory jack.
3. Chassis wash bays:
 - a. Control console and components in chassis wash bay shall be waterproofed and suitable for use in a wet environment.

E. Accessories:

1. Repair bays:
 - a. Platform lighting system: Individual fluorescent lamps (built in), with

- unitized waterproof construction and clear shatterproof tubes, eight each
 - b. Finish: Durable finish or treatment from manufacturer's set of standard colors
- 2. Chassis wash bays:
 - a. Platform lighting system: Individual fluorescent lamps (built in), with unitized waterproof construction and clear shatterproof tubes, eight each
 - b. Finish: Special finish or treatment suitable for use in the intense wet environment of a chassis wash installation with possible long term exposure and/or immersion in a corrosive water solution

F. Utility Requirements:

- 1. Plumbing: Compressed air, 1/2 inch, 120 PSI, 2 CFM
- 2. Electrical: 460 VAC, 3 phase, 15 HP

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.
- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items and specified accessories.
- C. Report in writing to the Architect, any damaged, missing or incomplete scheduled equipment and improper rough-in or utility stub-outs.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect or designated representative.
- B. Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb, and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
- C. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.
- B. Each lift shall be tested with the vehicle types operated by the Owner.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing and installation debris from job site.
- D. Notify Architect or designated representative for acceptance inspection.

3.05 TRAINING

- A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.
 - 1. 5641 Lift, axle, 2 post, 50,000 pounds, with shutter plates; 8 hours
 - 2. 5751 Lift, parallelogram, 50,000 pounds, 32'; 4 hours
- B. Demonstrate each lift operation utilizing each of the vehicle types operated by Owner.
- C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

END OF SECTION 14450

SECTION 14600

HOISTS AND CRANES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Equipment items as listed below by Equipment Identifier:
 - 1. 5020 Crane, bridge, underhung, 1/2 ton, 8' span (Ref. Part 2.01)
 - 2. 5110 Crane, jib, 1 ton, foundation mounted, 10' (Ref. Part 2.02)
 - 3. 5391 Hoist, chain, electric, motorized trolley, 1 ton (Ref. Part 2.03)
- B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.
- C. Wiring, and switching between equipment and utilities.

1.03 QUALITY ASSURANCE

- A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.
- B. Manufacturer's Representative:
 - 1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out, and start up.
 - 2. Training: Provide technical representative to provide training to Owner's maintenance personnel in operation and maintenance of specified equipment.
 - 3. Quality standards shall meet or exceed ISO-9001.

1.04 SUBMITTALS

- A. Product Data: Submit Product Data in accordance with Division 1 of these specifications.
- B. Operations and Maintenance Manual:
 - 1. Provide complete parts, operating, and maintenance manual covering equipment at time of installation.
 - 2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Fold out diagrams and illustrations are acceptable. Manual to be reproducible by dry copy

method. Provide copies per provisions of Division 1.

- C. Shop Drawings: Submit Shop Drawings in accordance with Division 1.

1.05 PRODUCT SUBSTITUTIONS

- A. Follow requirements specified in Division 1 - General Requirements.
- B. Additional costs resulting from substitution of products other than those specified, by model number, including drawing changes and construction, will be at the expense of the Contractor.
- C. Substitution Approval: Prior to delivery or installation, submittals for each equipment item by Equipment Identifier shall be provided in accordance with Division 1 - General Requirements. Acceptance will be based on the technical requirements herein as determined by Owner and Architect.

1.06 WARRANTY

- A. Warrant work specified herein for one year from substantial completion against defects in materials, functions, and workmanship.
- B. Warranty shall include materials and labor necessary to correct defects.
- C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish. Defects shall not include damage due to neglect, misuse, or situations resulting from non-performance of a manufacturer's recommended preventive maintenance schedule.
- D. Submit warranties in accordance with Division 1 - General Requirements of these specifications.
- E. All parts shall be readily available locally in the United States.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid and/or dusty conditions.
- B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Equipment Identifier of this specification.

1.08 LABELING

- A. Manufacturer shall securely attach in a prominent location, on each major item of equipment, a non-corrosive nameplate showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.
- B. Crane capacity shall be painted with letters and numbers 8 inches high minimum on

both sides of the bridge/boom.

- C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (UL) in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 - PRODUCTS

2.01 CRANE, BRIDGE, UNDERHUNG, 1/2 TON, 8 FOOT SPAN

Equipment Identifier: 5020

A. TO BE DEVELOPED

2.02 CRANE, JIB, FOUNDATION MOUNTED, 1 TON, 10 FEET

Equipment Identifier: 5110

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Gorbel Inc., Fishers, NY (716) 924-6262
 - b. Model: FS300-12-8
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Yale Industrial Products, Forest City, AR (501) 633-2250
 - b. Stanspec, Cleveland, OH (617) 482-8383

B. Capacities/Dimensions:

1. Lifting capacity: 1,000 pounds
2. Dimensions:
 - a. Boom span (center of pivot to boom end): 10 feet
 - b. Boom length: 13 feet, 1/2 inch
 - c. Boom travel: 8 feet, 3-1/2 inches
 - d. Boom depth: 8 inches
 - e. Clearance under boom: 16 feet
 - f. Footer depth: 4 feet
 - g. Footer width: 5 feet
3. Swing: 270 degrees
4. Weight: 1,354 pounds

C. Features/Performance/Construction:

1. Crane shall be base mounted with the mast inserted into a steel sleeve embedded in a concrete foundation. Sleeve, stabilizer pin, mounting plate, and anchor bolts shall be provided by manufacturer. (See shop drawings for anchor bolt pattern)
2. Crane boom shall be of American standard I-beam construction with trolley stops at both ends.
3. Crane mast head:
 - a. Mast head shall be of a steel plate box type welded construction or seamless tubing.
 - b. Mast head assembly shall surround mast on a sleeve principle with mating surfaces carried on upper and lower bearings.
 - c. Mast shall be a structural steel pipe with wall thickness sized for minimum deflection. Mast shall be equipped with stops to insure boom does not over swing.
4. Crane shall be able to swing a minimum of 270 degrees.
5. Crane shall have 1 ton hoist mounted to boom (Equipment ID # 5391).

D. Accessories:

1. Crane shall include a festoon assembly with cable rings.
2. Rotation stops.
3. One-ton hoist mounted to boom (reference Part 2.03 HOIST, CHAIN, ELECTRIC, MOTORIZED TROLLEY, 1 TON; Equipment Identifier: 5391)

E. Finish: Crane finish shall be a durable enamel in manufacturer's standard color.

2.03 HOIST, CHAIN, ELECTRIC, MOTORIZED TROLLEY, 1 TON
Equipment Identifier: 5391

A. Manufacturer's Reference:

1. Prime manufacturer: Specifications are based on equipment identified herein by manufacturer's name and model to establish minimal acceptable standards of quality, features, performance, and construction.
 - a. Coffing Hoists, Wadesboro, NC (704) 694-2156
 - b. Model: ECMT-2016-3-15, 1 ton hoist with low speed trolley and Accessories
2. Alternate manufacturers: *Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, equipment produced by other manufacturers, including the following, may be considered as equal.*
 - a. Lift-Tech International, Inc., Muskegon, MI (231) 733-0821
 - b. Yale Hoists, Inc., Forrest City, AR (501) 633-2250

B. Capacities/Dimensions:

1. Hoist:

- a. Lifting capacity: 2,000 pounds
- b. Motor: 1 HP
- c. Lifting speed: 16 FPM
- d. Lifting range: 15 feet
- e. Headroom, with trolley: 20 inches (maximum)

2. Trolley:

- a. Capacity: 2,000 pounds
- b. Motor: 1/4 HP
- c. Travel speed: 35 FPM
- d. I-beam size range: 6 to 18 inches, American Standard Section
- e. Weight: 213 pounds

C. Features/Performance/Construction:

1. Hoist shall have needle and ball type bearings with gears running in oil bath.
2. Frame shall be cast aluminum alloy.
3. Load hook and chain: Hook shall be forged steel with safety clip and shall be attached to cadmium plated chain by bearing type swivel.
4. Safety: Safety features shall include ratchet pawl mechanical load brake, overheating, and positive limit switches.
5. Hoist mounting: Hoist shall be lug mounted to trolley for minimum headroom.
6. Pendant Cable: Pendant cable shall be long enough to allow pendant to hang 36 inches above finished floor.
7. Hoist shall be mounted on Jib Crane Equipment Identifier #5110 (as described in part 2.01) as shown on Equipment Layout Drawing EQ113.

D. Controls: Four pushbutton pendant, with cord strain relief bushings, for hoist UP/DOWN and trolley FORWARD/REVERSE

E. Accessories:

1. Electrification kit: Round Cable Festooning package to reliably supply power to moving hoist
2. Chain container: Mounted to hoist, Duff Norton No. 927JG18

F. Utility Requirements - Electrical: 230 VAC, 3 phase, 1 HP

PART 3 - EXECUTION

3.01 INSPECTION

- A. Coordinate location of rough-in work and utility stub-outs to assure match with

equipment to be installed.

- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all equipment items and specified accessories.
- C. Report in writing, to the Architect, any damaged, missing, or incomplete scheduled equipment, and improper rough-in work or utility stub-outs.

3.02 INSTALLATION

- A. Perform work under direct supervision of Foreman of Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect or designated representative.
- B. Reference structural drawings and coordinate length of run and exact span dimensions with shop drawings and construction documents.
- C. Crane shall meet all OSHA design and clearance guidelines.
- D. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Attach equipment as directed by Architect or designated representative. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
- E. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.03 TESTING

- A. Specification Compliance: After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with specifications in the presence of the Architect or designated representative using acceptance procedures provided by the manufacturer.

3.04 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing and installation debris

from job site.

D. Notify Architect or designated representative for acceptance inspection.

3.05 TRAINING

A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. 5020 Crane, bridge, underhung, 1/2 ton, 8' span; 4 hours
2. 5110 Crane, jib, 1 ton, foundation mounted, 10'; 2 hours
3. 5391 Hoist, chain, electric, motorized trolley, 2 tons; 2 hours

B. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

END OF SECTION 14600

SECTION 15050

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Each section included in Division 15 - Mechanical is incomplete without the provisions stated herein.

1.03 RELATED SECTIONS

- A. Section 02324 - Trenching.
- B. Division 8 Section "Access Doors And Frames."
- C. Section 09910 - Paints.
- D. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. IEEE C2 - National Electrical Safety Code.
- D. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.05 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word shall be understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.
- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions which directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with piping, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.
- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.06 REGULATORY REQUIREMENTS

- A. Perform work in accordance with the editions, revisions, amendments, or supplements of applicable statutes, ordinances, codes, or regulations of Federal, State, and Local Authorities having jurisdiction in effect on the date bids are received.
- B. Where approval standards have been established by OSHA, UL, ASME, AGA, AMCA, ANSI, ASHRAE, ARI, NFPA, State Fire Insurance Regulatory Body, follow these standards whether or not indicated on the Drawings and Specifications. Include cost of work required to comply with requirements of these authorities in the original proposal.
- C. Requirements in reference specifications and standards are minimum for equipment, material, and work. In instances where capacities, size, or other features of equipment, devices, or materials exceed these minimums, meet listed or shown capacities.
- D. Resolve code violations discovered in Contract Documents with A/E prior to Contract award. After Contract award, make corrections or additions necessary for compliance with applicable codes.
- E. Arrange with local and state authorities and utility companies for permits, fees, and service connections for temporary and permanent water, sanitary sewer, storm and industrial waste services, verifying locations and arrangement, and pay charges including inspections.

1.07 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between piping, equipment, architectural, and structural work.
- B. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.
- C. Horsepower ratings on motors are based on scheduled equipment and design conditions. Actual field condition or substitutions from scheduled equipment may require different horsepower. If larger motor sizes are required, coordinate electrical service to ensure proper wire sizes and devices.
- D. Provide valves, stopcocks, waste cocks, strainers, and connections where shown on Drawings and where required for controlling the various pieces of equipment. Install valves where branches take off from mains for domestic water, hot water, chilled water, compressed air and natural gas.
- E. Drawings are based on equipment specified. Make adjustments, modifications, or changes required, due to use of other equipment.

1.08 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing Work.

B. Space Requirements:

1. Consider space limitations imposed by contiguous work in location of equipment and material. Do not provide equipment or material which is not suitable in this respect.

C. Conceal piping and ductwork in finished areas, except in mechanical rooms, and where noted otherwise on the drawings. Route pipes and ducts through the building without interfering with other contractors equipment or construction.

1. Provide maximum possible clear height underneath piping and ductwork.
2. Install equipment requiring service so that it is easily accessible.
3. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
4. Timely place equipment too large to fit through finished openings and stairways.

D. Site Obstructions:

1. Drawings indicate certain information pertaining to surface and subsurface obstructions which has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
4. Assume total responsibility for and repair damage to existing utilities caused by construction, whether or not such existing facilities are shown. Repair the lines, if damaged.

E. Cutting and Patching:

1. Submit written request to A/E in advance of cutting or alterations.
2. Execute cutting and demolition by methods which will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances, and finishes specified.
4. Escutcheon Plates.
5. Heavy chrome-plated or nickel-plated escutcheon plates for penetrations of finished surface.
6. Product: B&C No. 10 with concealed hinges.
7. Fit work airtight to pipes, sleeves, ducts, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.09 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request for supplementary instructions to A/E in cases of doubt as to Work intended or in the event of need for explanation thereof.
- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.
- F. Prior to the purchase of materials manufactured outside the United States, submit complete certifications and typical mill reports for review. Provide mill heat markings on foreign pipe delivered to job site; make available corresponding mill test reports.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Store equipment in a clean, dry place protected from other construction. While stored maintain factory wrapping or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.
- C. Adequately brace and package equipment to prevent breakage and distortion while in transit.

1.11 YEAR 2005 COMPLIANCE WARRANTY

- A. Provide hardware, software, and firmware products and other products and designs that accurately process date/time data (including calculating, comparing, and sequencing) from, into the year 2005 and leap year calculations to the extent that other information technology, used in combination with the information technology being acquired, properly exchanges date/time data with it.
- B. If the Contract requires that specific listed products must perform as a system in accordance with this warranty, then extend that warranty to those listed products as a system.
- C. If the Contract requires verification through testing that Products provided are Year

2005 compliant, provide, upon request, a copy of testing results which verify that Products are Year 2005 compliant.

- D. The duration of this warranty and the remedies available to the Owner for breach of this warranty are as defined in and subject to, the terms and limitations of the standard commercial warranty or warranties under this Contract, the remedies available to the Owner under this warranty are limited to repair or replacement of any listed product whose noncompliance is discovered and made known in writing within 360 days after acceptance.
- E. Do not construe anything in this warranty to limit any rights or remedies the Owner may otherwise have under this Contract with respect to defects other than Year 2005 performance.

1.12 EXCAVATION

- A. Trenching and backfilling shall comply with Section 02324 - Trenching as well as provisions specified herein.
- B. Trenching:
 - 1. Provide minimum 12 inches between outer surfaces and embankment or shoring which may be used, when excavating for manholes and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
 - 2. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching, and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
 - 3. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 1-Foot Minimum Cover: Sanitary sewer, storm drainage, industrial waste, acid waste.
 - b. 2-Foot Minimum Cover: Domestic water, fire line.
- C. Backfilling:
 - 1. Backfill trenches after piping, fittings, and joints have been tested and approved.
 - 2. Backfill trenches with sand to provide 6 inches sand below piping and 12 inches sand cover.
 - 3. Backfill remainder of trenches with satisfactory materials. Backfill shall be material specified as "Fill" in Section 02055 - Soils or on-site soil conforming to the referenced geotechnical investigation. Place and compact fill as specified in Section 02324 - Trenching. Take care not to damage utility lines.
 - 4. Backfill trench utility line with sand backfill material in 6-inch layers, where trenches cross streets, driveways, building slabs, or other pavements. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide

the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

1.13 WELDING

- A. Weld piping and above grade steel tanks in accordance with qualified procedures using performance qualified welders and welding operators. Qualified procedures and welders in accordance with ASME Section IX. Welding procedures qualified by others and welders and welding operators qualified by another employer may be accepted as permitted by ANSI B31.1. Notify the A/E 24 hours in advance of tests, and perform the tests at the work site if practicable. Furnish A/E with a copy of qualified procedures and a list of names and identification symbols of qualified welders and welding operators. Apply welders or welding operators assigned symbols near each weld they make as permanent record.

1.14 PAINTING

- A. Refer to Division 9 Painting Sections.
- B. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- C. Repair damage to factory painted finishes.
- D. Remove splattered and incidental paint from mechanical equipment.

1.15 PILOT INSTALLATION

- A. Provide a pilot installation of items of equipment which are concealed and require service, such as variable air volume boxes, fan coil units, and hot water coils. Have pilot installation approved before further installation work is performed for the particular items of equipment.

1.16 ACCESS DOORS

- A. See Division 8 Section "Access Doors And Frames."

1.17 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Refer to ASHRAE handbook for recommended noise criteria (NC) unless otherwise noted. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts, or other parts of work, rectify such conditions at no additional compensation.

1.18 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete mechanical systems. Prove operation of equipment to A/E. Notify A/E seven days prior to beginning equipment start-up.

- B. Certify in writing that these services have been performed.
- C. Perform tests as specified in Section 15950.

1.19 SERVICE

- A. Inspect, clean, and service air filters and strainers immediately prior to final acceptance of project. Replace disposable type air filters.
- B. Provide lubrication for operation of equipment until final acceptance of the equipment by A/E. Protect bearings during installation and thoroughly grease steel shafts to prevent corrosion. Provide extended lubrication lines for parts requiring lubrication which are concealed or inaccessible.
- C. Provide complete and working charge of proper refrigerant, free of contaminants, into each refrigerant system. After each system has been in operation long enough to ensure completely balanced conditions, check the charge and modify it for proper operation as required.
- D. Provide protective guard for belts, pulleys, gears, couplings, projecting set screws, keys, and other rotating parts which are located so a person might come in close proximity with. Construct protective guard around angle iron frame, securely bolted to apparatus; comply with safety requirements. Install guard to completely enclose drives and pulleys, and not interfere with lubrication of equipment. Provide 2-inch minimum diameter opening in fan belt guards housing for tachometer.
- E. Place mechanical systems in complete working order, and clean and polish fixtures, equipment, and materials thoroughly returning to "as new" condition prior to request for final review.
- F. Remove excess material and debris. Clean out lines and fittings and adjust valves. Broom clean areas. Thoroughly clean ductwork inside and out before grilles are installed.

1.20 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed piping, valves, and ductwork.
- B. Obtain Drawings from A/E, at Contractor's expense, and record as-built conditions.
- C. Clearly and accurately delineate the work by dimensions on the record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.
- D. Final record drawings shall be marked "AS-BUILT," and signed and dated by Contractor.
- E. Provide certified "AS-BUILT" drawings at the conclusion of project.

1.21 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.22 GUARANTEE

- A. Guarantee materials, parts, and labor for Work for one year from the date of issuance of occupancy permit. During that period, make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.
- B. Certain items of equipment, such as small sealed refrigeration units, are covered by the manufacturer's warranty of longer durations.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION 15050

SECTION 15051

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Preparation and submission of shop drawings and catalog data.
- B. Each section included in Division 15 - Mechanical incorporates this section by reference and is incomplete without the provisions stated herein.

1.03 RELATED SECTIONS

- A. Section 15052 - Operation and Maintenance Manuals.

1.04 MANUFACTURERS

- A. Listed manufacturers will be acceptable as long as specified requirements are met.
- B. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to A/E that their products comply with specified requirements. Those manufacturers shall agree in writing to bear the cost of A/E time to review compliance with Specifications whether their products are approved or not.

1.05 CONTRACTOR'S CERTIFICATION

- A. Submittals will be submitted only by Contractor. Indicate by signed stamp that Contract Documents have been checked, that the work shown in the submittals is in accordance with contract requirements and that dimensions and relationship with work of other trades have been checked. Submittals submitted for review that have not been checked and signed by Contractor, will be returned for checking before being considered by the A/E.

1.06 PREPARATION

- A. Include information relevant to particular equipment or materials to be furnished, where product data published by manufacturer is part of submittal.
- B. Provide documentation of compliance with manufacturer's published literature or drawings or letter signed by officer of manufacturer in cases where compliance with UL, FM, ARI, IRI, or other similar organization standards are required.
- C. Furnish all underground piping submittals within 15 days after receiving a signed contract and prior to the start of installation. Furnish all other HVAC and Plumbing submittals in one package at one time within 45 days after receiving a signed contract. No piece meal submittals will be accepted.

- D. Include identifying symbols and equipment numbers used in Contract Documents for all equipment and material submitted.
- E. Cross reference sheet numbers on Drawings for shop drawings. Provide shop drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment and clearances for maintenance and code requirements.
- F. Submit only requested submittals complete by types of equipment (i.e., pumps, air handling equipment, etc.) labeled with applicable specification section(s) included. Each submittal will be handled separately. Should any item not be acceptable, the entire submittal will be returned to Contractor for correction and resubmittal. Partial submittals will not be acceptable. The intent of this requirement is that all approved bound sets of data will be identical and will contain only acceptable information.
- G. Submit a compliance sheet for each submittal indicating the submittal is in full compliance with the drawings and specifications. Indicate by drawing number or specification section number and paragraph numbers all exceptions taken and include an explanation.
- H. The review of submittals does not relieve or modify Contractor's responsibility for compliance with Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that, in the review process, noting of some discrepancies but overlooking others does not grant Contractor permission to proceed in error. Regardless of any information contained in the submittals, Contract Documents govern the work, and are neither waived nor suspended in any way by the review of the submittals.
- I. A minimum review period of two weeks, exclusive of transmittal time, will be required in A/E office for each submittal. Take this time period into consideration when scheduling construction.
- J. Include in submittals sufficient plans, elevations, sections, performance data, dimensions, bolt locations, ratings, sound data, weights and schematics to clearly describe the equipment and to show compliance with these specifications. Provide a cover or title sheet for the submittal containing the following:
 - 1. Name of Contractor originating the submittal.
 - 2. Name of project for which the submittal is made.
 - 3. An index of all items submitted including:
 - a. Mark of equipment on drawings.
 - b. Manufacturer.
 - c. Catalog number.
 - d. Specification section number.
 - 4. Date of submittal and date of each revision.
 - 5. Contractor's certification of review.
 - 6. Contractor's certification of compliance.
- K. Shop drawings and product data which do not comply with specified requirements will be returned for resubmittal. Submit two paper sepias for shop drawings.

- L. A/E will retain one copy and the Owner will retain one copy of the submittal. Remaining copies will be returned to Contractor marked FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat the submittal in accordance with this section. It is intended that Contractor submit complete and accurate shop drawings and product data at the first submittal. If the submittals are returned to Contractor marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one additional submission is permitted.
- M. If the reproducible sepia or product data marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED is altered for any reason after it has been stamped, the REVIEWED stamp shall automatically be voided.
- N. Provide all work in accordance with the submittals stamped FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with Contract Documents. Where differences occur between the submittals and Contract Documents, Contract Documents shall govern the work.
- O. Provide one copy of all approved shop drawings and product data to the testing, adjusting and balancing contractor prior to project completion.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 REQUIRED SUBMITTALS

- A. Furnish product data for devices, equipment, or systems specified. All other submittals will be returned to Contractor without review. Furnish shop drawings as indicated.

3.02 FINAL SUBMITTAL

- A. In addition to the number of copies of shop drawings and product data required to review submittals, maintain separate file of final reviewed copies of such material. Deliver approved submittals in hardback binder for Owner's use. Incorporate changes and revisions made throughout construction period. Refer to Section 15052.

END OF SECTION 15051

SECTION 15052

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Preparation and submission of operation and maintenance manuals.
- B. Each section included in Division 15 - Mechanical incorporates this section by reference and is incomplete without the provisions stated herein.

1.03 RELATED SECTIONS

- A. Section 15050 - Mechanical General Provisions.
- B. Section 15051 - Submittals.
- C. Section 15950 - Testing, Adjusting and Balancing

1.04 PREPARATION

- A. Furnish four copies of complete operation and maintenance instructions, service manuals and parts list applicable to each manufactured item of equipment furnished. Bind operation and maintenance information in four separate loose leaf binders and deliver to the A/E at least four weeks prior to final review of the project.
- B. Organize binders to contain like equipment such as pumps, piping, valves or air handlers, terminal boxes, condensers, etc., in separate divisions. Provide a complete double index for each binder to include:
 - 1. An alphabetized list of the products by name.
 - 2. An alphabetized list of manufacturers whose products have been incorporated in the work, together with their addresses and the name, addresses and telephone numbers of the local sales representative or supplier.
- C. For each section of product, equipment or system, organize the data as follows:
 - 1. Furnish a general description of the equipment or system listing the major components, intended service and other general data.
 - 2. Furnish technical data including nameplate data, design parameters, ratings, capacity, performance data, operating curves, characteristics and the like. Clearly distinguish between information which does and does not apply.
 - 3. List warnings and cautions to be observed during both installation and operations.
 - 4. Fully detailed installation and operation instructions including special tools required, alignment instructions, start-up, and shut-down sequences.

5. Furnish maintenance, service and repair instructions including maintenance and service schedules, materials, and methods for performing routine and annual service.
6. Furnish a troubleshooting guide and check list indicating common failures, test methods and procedures for determining component fault or failure.
7. Furnish a spare parts list indicating part and order number with name, address, and telephone number of supplier. Include current prices of replacement parts and supplies.
8. Furnish diagrams including controls, wiring, installation or operation of the equipment or system.
9. Furnish copies of all approved submittals. Refer to Section 15051.
10. Furnish copies of all test reports. Refer to Section 15950.
11. Print copies of the "AS-BUILT" drawings. Refer to Section 15050.
12. Furnish all warranties and guarantees.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION 15052

SECTION 15060

HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Supports, anchors and sleeves applicable to mechanical, plumbing, and fire protection systems, including:
 1. Pipe, duct, and equipment hangers, supports, and associated anchors.
 2. Equipment bases and supports.
 3. Sleeves and seals.
 4. Flashing and sealing equipment and pipe stacks.

1.03 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Provide hanger and support inserts and sleeves and coordinate placement into formwork.

1.04 RELATED SECTIONS

- A. Section 15083 - Piping Insulation.

1.05 REFERENCES

- A. NFPA 13 - Standard for the Installation of Sprinkler Systems.
- B. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.06 QUALITY ASSURANCE

- A. Supports for Sprinkler Piping: NFPA 13.
- B. Supports for Standpipes: NFPA 14.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Provide malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis.
- C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll.

- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- J. Design hangers without disengagement of supported pipe.
- K. Copper Pipe Support and Hangers: Carbon steel ring, adjustable, copper plated.
- L. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180-degree segments, minimum 12 inches long at pipe support.
- M. Shield for Insulated Piping 2-1/2 Inch and Larger (Except Cold Water Piping): Use pipe covering protective saddles.
- N. Shields for Insulated Cold Water Piping 2-1/2 Inch and Larger: Galvanized steel shields in 180-degree segments in accordance with following table:

Pipe	Metal Gage	Shield Length
2 1/2" to 5"	16	12"
6" to 12"	14	24"
Over 12"	12	24"

- O. Shields for Vertical Copper Pipe Risers: Sheet lead.

2.02 HANGER RODS

- A. Steel, threaded both ends, threaded one end or continuous threaded.

2.03 INSERTS

- A. Provide malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.

- B. Lead Flashing: 5 pounds per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gage minimum; use 16 gage at fire resistant elements.

2.05 EQUIPMENT BASES AND SUPPORTS

- A. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment in main central plant area, areas with floors below grade, penthouse equipment rooms, floor mounted air handling units and where shown on Drawings.
- B. Provide prefabricated curbs for roof mounted equipment with the equipment.

2.06 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 16 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Above Grade: Form with 18 gage galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Provide prefabricated fire rated sleeves including seals, UL listed; or provide Schedule 40 galvanized steel, sized for minimum 1 inch space between sleeve and carrier pipe.
- D. Sleeves for Pipes Through Floor Supporting Riser Piping: Standard weight galvanized steel pipe.
- E. Sleeves for Pipes Through Roof: Standard weight galvanized steel pipe.
- F. Sleeves for Round Ductwork: Form with galvanized steel.
- G. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.
- H. Provide fire-stop compound at all penetrations of floor slabs or firewalls such that fire rating integrity of barrier is not lessened.
- I. Caulk: Caulk all sleeves water and airtight.
- J. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping. Provide pipe sleeves one size larger than the pipe it serves, including insulation, except where "Link Seal" casing seals are used.
- K. Sleeves Penetrating Walls Below Grade: Provide "Link-Seal" casing seal and sleeve as manufactured by Thunderline Corporation, Wayne, Michigan, for all pipes passing through walls below grade.

2.07 FINISHES

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl

spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

- B. Provide corrosion resistant hangers and supports for all piping and ductwork in corrosive atmosphere.

2.08 ANCHOR BOLTS

- A. Provide galvanized anchor bolts for all equipment placed on concrete pads or on concrete slabs of the size and number recommended by the manufacturer of the equipment.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
1/2" to 1-1/4"	6'-6"	3/8"
1-1/2" to 2"	10'-0"	3/8"
2-1/2" to 3"	10'-0"	1/2"
4" to 6"	10'-0"	5/8"
8" to 12"	14'-0"	7/8"
14" and Over	14'-0"	1"
PVC (All Sizes)	6'-0"	3/8"
C.I. Bell and Spigot (or No-Hub)	5'-0" and at Joints	

- B. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with five feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide corrosion resistant hangers by Corr-Tech for all piping hangers in corrosive areas. Provide hanger rods, bolts, nuts and all metal parts coated with the same material as hangers.

3.02 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, provide inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.03 FLASHING

- A. Provide flexible flashing and metal counterflashing where sleeves, piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24-inch by 24-inch sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36-inch by 36-inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- F. Flexible sheet metal flashing and counterflashing on all roof curbs for mechanical equipment on roof; seal watertight.

3.04 EQUIPMENT BASES AND SUPPORTS

- A. Coordinate installation of equipment bases of concrete type specified under Division 3 for all outdoor equipment on grade and floor mounted equipment in main central plant area, areas with floors below grade, penthouse equipment rooms, floor mounted air handling units and where shown on Drawings.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.
- E. Provide base of a minimum height of 4 inches above finished grade and a width that projects a minimum of 3 inches beyond equipment on all sides. Bevel edges of base.

- F. Prepare surface under bases by cleaning, clearing, chipping and roughing.
- G. Provide curbs of 14 inches minimum height above roofing surface for installation of mechanical equipment on roof.

3.05 SLEEVES

- A. Provide sleeves for all pipe penetrations through walls, roof or slab above grade.
- B. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- C. Extend sleeves through floors 2 inches above finished floor level. Caulk sleeves full depth and provide floor plate.
- D. Where piping or ductwork penetrates floor, ceiling or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration. When penetration is through a fire rated floor or wall, provide fire safing insulation so that the assembly when complete is UL listed and equals the fire rating of construction penetrated by the sleeve.
- E. Install chrome plated steel escutcheons at finished surfaces.
- F. Provide three 6 inch long reinforcing rods welded at 120-degree spacing to the sleeve on all sleeves supporting riser piping 4 inches and larger. Embed reinforcing rods in concrete or grout to existing concrete.
- G. Install sleeve assembly for walls below grade with 1/4-inch thick plate located in the middle of the wall.
- H. Neatly cut holes in existing walls, floors and roofs for placement of sleeves. Place sleeve and grout, and caulk annular space to provide finished appearance.
- I. Install pipe in sleeve so that neither the pipe nor its insulation touches the sleeve at any point.
- J. Seal space between pipe and sleeve watertight for all sleeves penetrating the roof.

3.06 ANCHOR BOLTS

- A. Locate position of anchor bolts by means of suitable templates.
- B. When equipment is placed on vibration isolators, secure equipment to the isolator and the isolator to the floor, pad or support as recommended by the vibration isolator manufacturer.

3.07 INSULATION SHIELDS

- A. Provide insulation shields at every hanger support.
- B. Provide shields of the proper length to distribute weight evenly and to prevent sagging or indentation of insulation at hanger.

- C. Install shield so that hanger is placed at the center of the shield.
- D. Attach shield to insulation with adhesive to prevent slippage or movement; refer to Section 15083.

END OF SECTION 15060

SECTION 15070

VIBRATION ISOLATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Vibration isolators for rotary, dynamic, or reciprocating equipment or components; include:
 - 1. Inertia bases.
 - 2. Vibration isolation.

1.03 REFERENCES

- A. ASHRAE - Guide to Average Noise Criteria Curves.

1.04 SUBMITTALS

- A. Indicate isolation base dimensions.
- B. Indicate vibration isolator locations, with static and dynamic load.
- C. Include calculations required to certify compliance with specified requirements.
- D. Submit manufacturer's certificate that isolators are properly installed and properly adjusted to meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.
- B. Provide vibration isolation devices, including auxiliary steel bases and pouring forms, from a single manufacturer or supplier who will be responsible for complete coordination of all phases of this work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Amber-Booth Company.
- B. Korfund Dynamics Corporation.
- C. Mason Industries.

2.02 ISOLATION BASES

- A. Type A: Integral structural steel fan and motor base with motor slide rails.
- B. Type B: Slung structural steel base with gusseted brackets.
- C. Type C: Reinforced 3,000 pounds per square inch concrete base set in full depth perimeter structural steel channel frame, with gusseted brackets and anchor bolts.
- D. Type D: Reinforced 3,000 pounds per square inch concrete base with chamfered edges without channel frame.

2.03 VIBRATION ISOLATORS

- A. Type 1: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
- B. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).
- C. Type 3: Open spring mount with stiff springs, heavy mounting frame, and limit stop.
- D. Type 4: Closed spring hanger with acoustic washer.
- E. Type 5: Closed spring hanger with 1 inch thick acoustic isolator.
- F. Type 6: Rubber waffle pads, 30 durometer, minimum 1/2-inch thick, maximum loading 40 pounds per square inch. Use neoprene in oily or exterior locations.
- G. Type 7: 1/2-inch thick rubber waffle pads bonded each side of 1/4-inch thick steel plate.
- H. Type 8: Type BRD-1 rubber-in-shear isolators. Size isolator for 0.35-inch deflection.

2.04 FABRICATION

- A. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.
- B. Color code spring mounts.
- C. Select springs to operate at two-thirds maximum compression strain, with 1/4-inch ribbed neoprene pads.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install vibration isolators for motor driven equipment.
- B. Set steel bases for 1-inch clearance between housekeeping pad and base. Set concrete inertia bases for 2-inch clearance. Adjust equipment level.

- C. Provide spring isolators on piping connected to isolated equipment as follows: up to 4-inch diameter, first three points of support; five to 8-inch diameter, first four points of support; 10-inch diameter and over, first six points of support. Static deflection of first point to be twice deflection of isolated equipment.
- D. Provide minimum of four hangers for each fan coil unit and VAV box. Provide isolators for each hanger.

3.02 SCHEDULE

Isolated Equipment	Base Type	Isolator Type
Air Handling Units		
Floor Mounted	B	1
Suspended	B	5
Centrifugal Fans		
Class I & II to 54 Inches	A	1
Class I & II over 60 Inches	A & C	1
Class III	A & C	1
Air Compressors & Water Chillers		
	C & D	1
Engine Driven Generators & Pumps		
	C & D	1 or 3
Centrifugal Chillers		
Slab on Grade	D	6
Other than Slab on Grade	C	1
Pumps		
3 horsepower & Smaller	B	6 or 7
5 horsepower & Over	C	2
Piping		
		4
Ductwork		
		N/A
VAV Boxes		
		8
Fan Coil Units		
		8
* Internal isolated units do not require external spring isolator. Mount directly to housekeeping pad.		

END OF SECTION 15070

SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Furnish and install materials for identification of mechanical products installed under Division 15.

1.03 RELATED SECTIONS

- A. Section 09900 - Paints and Coatings.

1.04 REFERENCES

- A. ANSI A13.1 - Scheme for the Identification of Piping Systems.
- B. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.05 SUBMITTALS

- A. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. W. H. Brady Company.
- B. Craftsmark.
- C. Markem Corporation.
- D. Seton Name Plate Company.

2.02 MATERIALS

- A. Color: Meet requirements of ANSI A13.1, unless specified otherwise.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved white letters on a black background; minimum size 3 inches long and 1 inch high. Minimum lettering height for numbers and names is 1/4-inch and other data is 1/8-inch.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

- D. Stencils: With clean cut symbols and letters 2-1/2 inch high for ductwork and equipment.
- E. Stencil Paint: Semi-gloss, high build epoxy ester or alkyd paint.
- F. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.
- G. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- H. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inches wide by 4 mils thick, manufactured for direct burial service.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Plastic Nameplates: Secure nameplates to equipment fronts using corrosive resistant screws and rivets. Install nameplates parallel to equipment lines.
- B. Metal Tags: Install with corrosive-resistant chain and "j-hook."
- C. Stencil Painting: Apply single coat sufficient to cover background completely with minimum 4 mils dry film thickness.
- D. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- E. Plastic Tape Pipe Markers: Install completely around pipe in accordance with manufacturer's instructions.
- F. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.
- G. Equipment
 1. Identify mechanical equipment scheduled on Drawings with nameplates, except for air devices, sprinkler heads, plumbing fixtures, and plumbing shock absorbers.
 2. Identify name, number, function, capacity, and other pertinent information of air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates.
- H. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- I. Valves: Identify valves in main and branch piping with metal tags.

- J. Fire Dampers: Label with plastic nameplates in accordance with NFPA 90A.
- K. Piping: Paint exposed piping in colors to meet ANSI standards. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Identify service, flow direction and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 10 feet on straight runs, including risers and drops, adjacent to each valve and tee at each side of penetration of structure or enclosure and at each obstruction. Provide a flow arrow at each identification marker.
- L. Ductwork: Identify ductwork with stenciled painting. Identify as to air handling unit number, and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure and at each obstruction.
- M. Use identification of equipment on the "Record Drawings" for nameplate designations.
- N. Attach identification for items such as special switches, etc., located in finished areas, on or in the immediate vicinity of the item.

3.03 VALVE CHART AND SCHEDULE

- A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed.

3.04 COLOR CODE FOR MARKING PIPE

MATERIAL	BAND	LETTERS AND ARROW	LEGEND
Cold water (potable) WATER	Green	White	POTABLE
Fire protection water WATER	Red	White	FIRE PR.
Hot water (domestic)	Green	White	H.W.
Hot water recirculating (domestic)	Green	White	H.W.R.
High temp. water supply	Yellow	Black	H.T.W.S.
High temp. water return	Yellow	Black	H.T.W.R.
Boiler feed water	Yellow	Black	B.F.
Low temp. water supply (heating)	Yellow	Black	L.T.W.S.
Low temp. water return (heating)	Yellow	Black	L.T.W.R.
Condenser water supply	Green	White	COND. W.S.
Condenser water return	Green	White	COND. W.R.
Chilled water supply	Green	White	C.H.W.S.
Chilled water return	Green	White	C.H.W.R.
Treated water	Yellow	Black	TR. WATER
Chemical feed	Yellow	Black	CH. FEED
Compressed air	Yellow	Black	COMP. AIR
Natural gas	Blue	White	NAT. GAS
Freon	Blue	White	FREON
Fuel oil	Yellow	Black	FUEL OIL
Steam	Yellow	Black	STM.
Condensate	Yellow	Black	COND.

3.05 COLOR CODE MARKING SIZES

OUTSIDE DIAMETER OF PIPE COVERING (INCHES)	LENGTH OF COLOR BAND (INCHES)	ARROW LENGTH BY WIDTH (INCHES)	SIZE OF LEGEND LETTERS AND NUMERALS (INCHES)
Less than 1-1/2	8	8 x 2-1/4	1/2
1-1/2 to 2-3/8	8	8 x 2-1/4	3/4
2-1/2 to 7-7/8	12	8 x 2-1/4	1-1/4
8 to 10	24	12 x 4-1/2	2-1/2
Over 10	32	12 x 4-1/2	3-1/2

END OF SECTION 15075

SECTION 15081
DUCT INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Thermal and acoustical insulation applied externally or internally to ductwork and air handling devices; including:
 - 1. Duct insulation.
 - 2. Insulation jackets.
 - 3. Duct liner.

1.03 RELATED SECTIONS

- A. Section 09910 - Paints.
- B. Section 15810 - Ducts.

1.04 REFERENCES

- A. ASTM C 553 - Mineral Fiber Blanket and Felt Insulation.
- B. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation.
- C. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.05 SUBMITTALS

- A. Include product description, list of materials, and thickness for each service and location.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in duct insulation application with three years minimum experience.
- B. Materials: UL listed; flame spread/fuel contributed/smoke developed rating of 25/25/50 in accordance with ASTM E 84.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Certainteed Corporation.

- B. Knauf Fiber Glass.
- C. Manville Corporation.
- D. Owens-Corning Fiberglass Corporation.

2.02 MATERIALS

- A. Type A: Flexible glass fiber; ASTM C 553; commercial grade; 'k' value of 0.29 at 75 degrees F; 1 pound per cubic foot minimum density; 0.002-inch foil scrim kraft facing for air ducts.
- B. Type B: Rigid glass fiber; ASTM C 612, Class 1; 'k' value of 0.24 at 75 degrees F; 0.002-inch foil scrim kraft facing for air ducts.
- C. Type C: Ductliner, flexible glass fiber; ASTM C 553; 'k' value of 0.28 at 75 degrees F; 1-1/2 pounds per cubic foot minimum density; coated air side for maximum 4,000 feet per minute air velocity.
- D. Adhesives: Waterproof vapor barrier type, Childers CP-82.
- E. Finish: Vapor barrier finish coating, Childers CP-33.
- F. Jacket: Presized glass cloth, minimum 7.8 ounces per square yard.
- G. Lagging Adhesive: Fire resistive to ASTM E 84, Childers CP-82.
- H. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.
- I. Lagging: 2 inch high density fiberglass, 6 pounds per cubic foot, covered with a 0.016 acoustically treated stucco embossed with 1-1/4 pounds per square foot aluminum cladding, Childers Muffl-Jac.
- J. Joint Tape: Glass fiber cloth, open mesh.
- K. Tie Wire: Annealed steel, 16 gage.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install exterior materials after duct has been tested and approved.
- B. Clean surfaces for adhesives.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Provide insulation on exterior of all round duct.

C. Insulation (Types A and B) Application for exterior of duct in Interior of Building:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Install without sag on underside of ductwork. Use 4 inch wide strips of adhesive on 8 inch centers or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
3. Insulate standing seams and stiffeners which protrude through the insulation with 1-1/2 inch thick, unfaced, flexible blanket insulation. Cover with glass cloth and coat with vapor barrier finish coating.
4. On circumferential joints, the 2-inch flange on the facing shall be secured with 9/16-inch outward clinch steel staples on 2-inch centers, and taped with a minimum 3 inch wide strip of glass fabric and finish coating.
5. Cover seams, joints, pin penetrations and other breaks finish coating reinforced with glass cloth.

D. Liner (Type C) Application:

1. Adhere insulation with adhesive for 100 percent coverage. Secure insulation with mechanical fasteners on 15-inch centers maximum on top and side of ductwork with dimension exceeding 20 inches. Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
2. Ductwork dimensions indicated are net outside dimensions required for air flow. Insulation thickness already incorporated in duct size.
3. Omit lining as necessary to permit satisfactory operation of dampers and air control devices. Provide 1-1/2 inch external insulation 6 inches beyond the liner termination.
4. Coat all exposed edges and leading edges of cross joints with adhesive.

E. Noise Control and Sound Traps:

1. For noise control and sound traps, use lagging. Secure insulation with 100 percent coverage of lagging adhesive, pins and clips not more than 18 inches on center.
2. Secure bottom of duct insulation using alternate single and double clips. The first pin will secure the insulation and the second clip will be used to secure the cladding. Isolate the exterior clip from the cladding by using two 1/8-inch closed cell neoprene (Armaflex) washers on either side of the cladding. Pre-drill holes in cladding and avoid contact with pin during installation.
3. For round duct, secure insulation with 100 percent coverage of lagging adhesive. Secure cladding with 3/4-inch, 0.020-inch stainless steel bands on 12 inch centers.
4. For joints and overlaps, fold cladding to form a double thickness hem 2 inches minimum. Seal with a non-shrink, non-hardening sealing compound.

F. Walk-in Plenum Application: Adhere insulation on interior surface of plenum with adhesive for 100 percent coverage. Secure insulation with mechanical fasteners. Seal and smooth joints. Do not use nail-type fasteners.

G. Continue insulation with vapor barrier through penetrations.

3.03 SCHEDULE

A. Provide insulation or liner for duct in accordance with the following schedule:

Duct	Type	Insulation Thickness
Combustion Air Duct	A or B	1"
Exhaust Ducts within 10 feet of Exterior Openings and Exhaust Ducts Exposed to Outdoor Air	A or B	1"
Outside Air Intake Ducts	C	2"
Plenums	A or B	1"
Ventilation Equipment Casings	A or B	2"
Concealed Round, Rectangular, Supply, Exhaust or Return Duct	A or B	2"
Exposed Round Supply, Exhaust or Return Duct	C	1"
Rectangular Supply, Exhaust or Return within 10 feet of the Mechanical Room or Air Handler	C	2"

END OF SECTION 15081

SECTION 15083
PIPING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Thermal insulation for mechanical and plumbing piping systems including jackets and accessories.
- B. Mechanical system includes horizontal roof drains and waste lines which receive condensate from air handling units or evaporators as well as thermal system piping.

1.03 RELATED SECTIONS

- A. Section 09910 - Paints.
- B. Section 15060 - Hangers and Supports.
- C. Section 15160 - Storm Drainage Piping.

1.04 REFERENCES

- A. ASTM B 209 - Aluminum and Aluminum-alloy Sheet and Plate.
- B. ASTM C 177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C 195 - Mineral Fiber Thermal Insulation Cement.
- D. ASTM C 533 - Calcium Silicate Block and Pipe Thermal Insulation.
- E. ASTM C 547 - Mineral Fiber Preformed Pipe Insulation.
- F. ASTM C 552 - Cellular Glass Block and Pipe Thermal Insulation.
- G. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- H. ASTM E 96 - Water Vapor Transmission of Materials.

1.05 SUBMITTALS

- A. Include product description, list of materials, and thickness for each service and locations.
- B. Include detail drawings of insulation dams.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in piping insulation application with three years' minimum experience.
- B. Materials: Composite flame spread/smoke developed rating of 25/50 in accordance with ASTM E 84; includes jackets, adhesives, facing, coatings, and mastics.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Insulation:
 - 1. Armstrong.
 - 2. Certainteed Corporation.
 - 3. Knauf Fiber Glass.
 - 4. Manville Corporation.
 - 5. Owens-Corning Fiberglass Corporation.
 - 6. Pittsburgh Corning.
 - 7. Rubatex.
- B. Jackets:
 - 1. Childers.
 - 2. Manville Corporation.
 - 3. Premetco.

2.02 INSULATION

- A. Type A: Mineral fiber or fiberglass preformed insulation; ASTM C 547; 'k' value of 0.26 at 75 degrees F; noncombustible.
- B. Type B: Molded cellular glass insulation; ASTM C 552; maximum water vapor transmission rating of 0.005 perm-in; 'k' value of 0.415 at 75 degrees F.
- C. Type C: Elastomer, closed cell, flexible, insulation; ASTM E 96; maximum vapor transmission rating of 0.20 perms; ASTM C 177; 'k' value of 0.27 at 75 degrees F.
- D. Type D: Hydrous calcium silicate; ASTM C 533; rigid white; asbestos free; 'k' value of 0.44 at 300 degrees F.

2.03 JACKETS

- A. Interior, Concealed Applications:
 - 1. Type A Insulation: Provide factory applied white kraft foil vapor barrier.
 - 2. Type B Insulation: Cover with a fiberglass cloth jacket and finish coat.

3. Type C Insulation: Finish coat is not required.
4. Type D Insulation: Cover with a canvas jacket and adhesive.
5. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjoining pipe. Use insulating cement to fill voids and cracks. Finish with glass or canvas cloth and finish coat. PVC jackets may be used with glass cloth and finish coat.

B. Interior, Exposed Applications:

1. Type A Insulation: Provide factory applied white kraft foil vapor barrier. Also finish with canvas jacket or fiberglass cloth with Childers CP-52 finish. Size for finish painting. Do not use PVC jackets. Verify jacket is suitable for applications.
2. Type B Insulation: Cover with a fiberglass cloth jacket and finish coat.
3. Type C Insulation: Finish coat is not required.
4. Type D Insulation: Cover with a canvas jacket and adhesive.
5. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjoining pipe. Use insulating cement to fill voids and cracks. Finish with glass or canvas cloth and finish coat. PVC jackets may be used with glass cloth and finish coat.

C. Exterior Applications:

1. Insulate piping system as indicated under interior, concealed applications.
2. Provide electric heat tracing for all water piping.
3. Cover with aluminum or stainless steel jacket having integral moisture barrier with seams located on bottom side of horizontal piping.

D. Jacket Materials:

1. Factory Applied Jackets: White kraft bonded to reinforced foil vapor barrier with self-sealing adhesive joints.
2. PVC Jackets: One piece, premolded type, to meet flame spread and smoke developed rating of 25/50 in accordance with ASTM E 84.
3. Canvas Jackets: UL listed treated cotton fabric, 6 ounces per square yard.
4. Fiberglass Cloth Jackets: 9 ounces per square yard glass cloth.
5. Aluminum Jackets: ASTM B 209; 0.020-inch thick; smooth finish with factory applied moisture barrier.
6. Stainless Steel Jackets: Type 304 stainless steel; 0.010-inch thick; smooth finish.

2.04 ACCESSORIES

- A. Insulation Bands: 3/4-inch wide; 0.015-inch thick galvanized steel, stainless steel or 0.007-inch thick aluminum.
- B. Metal Jacket Bands: 3/8-inch wide; 0.015-inch thick aluminum or 0.010-inch thick stainless steel to match jacket.
- C. Insulating Cement: ASTM C 195; hydraulic setting mineral wool; Ryder One-Coat.
- D. Sealants: Used at valves, fittings and where insulation is terminated. Sealant is brush applied to end of insulation and continued along pipe surface. Provide Childers CP-76.

- E. Adhesives: Used to adhere the longitudinal lap seam of vapor barrier jackets and at butt joints between insulation or fitting covers. Provide Childers CP-82 as general purpose adhesive. Use Childers CP-97 fibrous adhesive for calcium silicate or when adhering pipe saddles and shields to the insulation.
- F. Primers: Provide Childers CP-53 primer to cover insulating cements prior to finishing coating.
- G. Finish: Provide Childers CP-33 as a general purpose finish to coat the longitudinal seams and butt joints of vapor barrier jackets or glass cloth jackets. Use Childers CP-52 AHV2 reinforced with glass cloth as an adhesive and sizing for canvas and in other locations as indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to be insulated and install insulation material after performance tests for piping have been completed and approved.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. Insulate fittings, valves, flanges and strainers. On flexible connections, expansion joints and unions, bevel and seal ends of insulation and continue sealant a minimum of 4 inches along the piping.
- E. On insulated piping conveying fluids between 100 degrees F and 140 degrees F, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations. Continue sealant a minimum of 4 inches along the piping.
- F. Provide dams in insulation at intervals not to exceed 20 feet to prevent migration of condensation or leakage.
- G. Provide an insert, except where pipe covering protection saddles are specified, not less than 12 inches long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2-1/2 inch diameter or larger, to prevent insulation from sagging at support points. Provide inserts for 180-degree arc and not less than the length of the pipe shield manufactured of cork, cellular glass or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used. Adhere pipe shield to insulation with adhesive.
- H. Neatly finish and seal all insulation at supports, protrusions and interruptions. Maintain water vapor retarder with mastic.

3.03 BURIED PIPING

- A. Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.04 SCHEDULE

Piping	Type	Pipe Size	Insulation Thickness
Domestic Hot Water, Tempered Domestic Water	A	1-1/2" & Smaller	1"
		2" to 4"	1-1/2"
		5" & Larger	2"
Engine Exhaust	D	1-1/2" to 2"	1-1/2"
		2-1/2" to 6"	2"
		8" to 14"	2-1/2"
		16" & Larger	3"
Domestic Cold Water	A	1-1/2" & Smaller	1"
		2" to 5"	1-1/2"
		6" & Larger	2"
	B	1-1/2" & Smaller	1"
		2" to 3"	1-1/2"
		4" & Larger	2"
	C	1" & Smaller	1/2"
Roof Drain and Underside of Drain, Cold Condensate Drain	A	2" & Smaller	3/4"
		2-1/2" & Larger	1"
Refrigerant Suction and Liquid	C	3" & Smaller	3/4"

END OF SECTION 15083

SECTION 15140

DOMESTIC WATER AND SANITARY DRAINAGE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Sanitary drainage and vent piping systems and domestic water piping, including valves and fittings.
- B. Miscellaneous apparatus attached to plumbing piping systems.

1.03 RELATED SECTIONS

- A. Section 15050 - Excavation.
- B. Section 15050 - Backfill.
- C. Section 02516 - Disinfection of Water Distribution.
- D. Section 15060 - Hangers and Supports.
- E. Section 15070 - Vibration Isolation.
- F. Section 15083 - Piping Insulation.
- G. Section 15410 - Plumbing Fixtures.
- H. Section 15480 - Domestic Water Heaters.
- I. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. ASME A112.26.1M - Water Hammer Arresters.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DMV.
- E. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- F. ASSE 1011 - Hose Connection Vacuum Breakers.
- G. ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

- H. ASSE 1019 - Wall Hydrants, Frost-Proof Automatic Draining Anti-Backflow Types.
- I. ASTM A 47 - Ferritic Malleable Iron Castings.
- J. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- K. ASTM A 74 - Cast Iron Soil Pipe and Fittings.
- L. ASTM A 234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- M. ASTM B 32 - Solder Metal.
- N. ASTM B 88 - Seamless Copper Water Tube.
- O. ASTM B 306 - Copper Drainage Tube (DWV).
- P. ASTM C 425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- Q. ASTM C 564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- R. ASTM C 700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- S. ASTM D 3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings (4 inches to 15 inches).
- T. ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- U. ASTM F 679 - Standard Specifications for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings (18 inches to 27 inches).
- V. AWS A5.8 - Brazing Filler Metal.
- W. AWWA C111 - Rubber Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
- X. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- Y. AWWA C606 - Grooved and Shouldered Joints.
- Z. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- AA. CISPI 310 - Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- BB. MSS SP-110 - Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- CC. PDI WH-201 - Water Hammer Arresters.

1.05 SUBMITTALS

- A. Include data on pipe materials, pipe fittings, and special fabricated items.
- B. Include component sizes, rough-in requirements, service sizes and finishes for specialties.
- C. Provide operation and maintenance manual.

1.06 QUALITY ASSURANCE

- A. For each product specified, provide components by same manufacturer throughout project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Valves:

- 1. Apollo.
- 2. Crane.
- 3. De Zurik.
- 4. Nibco.
- 5. Stockham.
- 6. Wilkins.

B. Floor Drains:

- 1. Jay R. Smith.
- 2. Josam.
- 3. Tyler/Wade.
- 4. Zurn.

C. Cleanouts:

- 1. Jay R. Smith.
- 2. Josam.
- 3. Tyler/Wade.
- 4. Zurn.

D. Backflow Preventers:

- 1. FEBCO.
- 2. Rockwell.
- 3. Watts.
- 4. Wilkins
- 5. Jay R. Smith

E. Water Hammer Arresters:

- 1. Precision Plumbing Products.
- 2. Sioux Chief.

3. Watts.

F. Hose Bibbs/Hydrants:

1. Chicago.
2. Jay R. Smith.
3. Josam.
4. Woodford.
5. Zurn.

G. Trap Primers:

1. Jay R. Smith.
2. Precision Plumbing Products.
3. Watts.

2.02 SANITARY SEWER AND VENT PIPING

A. Below Grade Within 5 Feet of Building:

1. Cast Iron Piping and Fittings: ASTM A 74, service weight, hub and plain end with CISPI 301 or ASTM C 564 neoprene elastomeric compression type gaskets.
2. Cast Iron Pipe and Fittings: CISPI 301, service weight hubless, with ASTM C 564, neoprene elastomeric compression type gasket system.

B. Above Grade:

1. Cast Iron Piping and Fittings: ASTM A 74, service weight, hub and plain end with ASTM C 564, neoprene elastomeric compression type gaskets.
2. Cast Iron Piping and Fittings: CISPI 301, service weight, hubless with CISPI 310 neoprene elastomeric gaskets and stainless steel clamp-and-shield assemblies.
3. Copper Tubing and Fittings: ASTM B 306, Type DWV with ASME B16.23 cast bronze or ASME B16.29 wrought copper fittings and ASTM B 32, grade 50B solder joints.

2.03 SANITARY PRESSURIZED PIPING (FROM SEWAGE EJECTOR)

A. Below Grade:

1. Piping: Ductile iron, AWWA C151.
2. Fittings: Ductile or gray iron, standard thickness with flanged or grooved ends.
3. Joints: AWWA C111, rubber gasket with 3/4-inch diameter rods or mechanical grooved couplings with a synthetic rubber gasket for AWWA pipe, AWWA C606.

B. Above Grade

1. Piping: Galvanized steel ASTM A 53, Schedule 40.
2. Fittings: ASME B16.3, galvanized malleable iron, ASTM A 234 forged steel welding type, or pregrooved cast iron fittings.
3. Joints: Screwed up to 2 inches in size. Over 2 inches welded or mechanical joint coupling with zero flex for grooved piping.

2.04 WATER PIPING

A. Below Grade Within 5 Feet of Building:

1. Pipe 2 Inches and Smaller; Copper Tubing: ASTM B 88, Type K, annealed.
 - a. Fittings: None.
 - b. Joints: AWS A5.8 BCuP silver braze (lead free).
2. Pipe Over 2 Inches; Copper Tubing: ASTM B 88, Type K, hard drawn.
 - a. Fittings: ASME B16.18, cast bronze or ASME B16.22, wrought copper and bronze.
 - b. Joints: AWS A5.8 BCuP silver braze (lead free).

B. Above Grade:

1. Pipe 2-1/2 Inches and Smaller; Copper Tubing: ASTM B 88, Type L, hard drawn.
 - a. Fittings: ASME B16.18, cast bronze, or ASME B16.22 wrought copper and bronze.
 - b. Joints: ASTM B 32, solder, Grade 95TA (lead free).
2. Pipe Over 2-1/2 Inches
 - a. Galvanized Steel Pipe: ASTM A 53, Schedule 40.
 - 1) Fittings: Cast iron.
 - 2) Joints: Grooved mechanical couplings.
 - b. Copper Tubing: ASTM B 88, Type K, hard drawn.
 - 1) Fittings: ASME B16.18, cast bronze or ASME B16.22, wrought copper and bronze.
 - 2) Joints: AWS A5.8 BCuP silver braze (lead free).

2.05 UNIONS, FLANGES AND COUPLINGS

A. Pipe 2 Inches and Smaller:

1. Ferrous Piping: 150 pounds per square inch-gage malleable iron threaded unions.
2. Copper Tubing: 150 pounds per square inch-gage bronze unions with soldered joints.

B. Pipe Over 2 Inches:

1. Ferrous Piping: 150 pounds per square inch-gage forged steel slip-on flanges; 1/16-inch thick preformed neoprene gaskets.
2. Copper Tubing: 150 pounds per square inch-gage slip-on bronze flanges; 1/16-inch thick preformed neoprene gaskets.

C. Grooved and Shouldered Pipe End Couplings:

1. Housing: ASTM A 47, malleable iron clamps to engage and lock, designed to

- permit some angular deflection, contraction and expansion; steel bolts, nuts and washers; galvanized for galvanized pipe.
2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.06 VALVES

A. Gate Valves:

1. 2 Inches and Smaller: Bronze body, 125 pounds per square inch steam, bronze trim, non-rising stem, handwheel, inside screw, single wedge or disc, solder or threaded ends.
2. Over 2 Inches: Iron body, 125 pounds per square inch steam, bronze trim, OS&Y rising stem, handwheel, wedge, flanged or grooved ends.

B. Globe Valves:

1. 2 Inches and Smaller: Bronze body, 125 pounds per square inch steam, bronze trim, rising stem, handwheel, inside screw, renewable composition disc, solder or screwed ends, with back seating capacity (repackable under pressure).
2. Over 2 Inches: Iron body, 125 pounds per square inch steam, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

C. Ball Valves:

1. 2 Inches and Smaller: Bronze body, full port, chrome plated brass/bronze ball, teflon seats, separate packnut with adjustable stem packing, rated 150 pounds per square inch steam and 600 WOG, solder or threaded ends. Valve ends shall have full depth ANSI threads or extended solder connections and be comply with MSS SP-110. Provide with balancing stops on hot water return line.
2. Over 2 Inches: Cast steel body, Class 150 stainless steel ball and stem, teflon seat and stuffing box seals, lever handle, flanged ends.

- D. Butterfly Valves: Iron body, aluminum bronze disc, 400 series stainless steel shaft, resilient liner seat, full lug body, shaft integral with disc. Provide valves absolute tight with 150 pounds per square inch pressure drop imposed across seat. Valves shall be capable for use as isolation valves and recommended by manufacturer for dead end service at full pressure without need for downstream flange. Provide gear operator for valves 8 feet and larger. Provide lever lock handle with toothed plate for shutoff service and infinitely adjustable handle with locknut and memory stop for throttling service for smaller sizes.

E. Swing Check Valves:

1. 2 Inches and Smaller: Rate 200 pounds per square inch WOG minimum water pressure, brass or bronze construction, bronze disc, threaded or soldered connections.
2. Over 2 Inches: Rated 200 pounds per square inch WOG minimum water pressure, iron body, brass mounted, flanged connections.

2.07 DRAINS

- A. Floor and Shower Drain, Toilets and Finished Areas: Coated cast iron body floor drain, two-piece body with double drainage flange, invertible nonpuncturing flashing collar, weepholes, bottom outlet, and adjustable satin nickel-bronze round strainer; Josam 30000-A Series. Provide 1/2-inch primer tap in P-trap and connect to trap primer.
- B. Floor Sink: 15-inch by 15-inch square cast iron, 8-3/8 inch deep floor sink with acid-resisting interior, double drainage flange with weepholes, aluminum internal dome strainer, nickel-bronze sanitary sloped rim and nickel-bronze anti-tilting grate. Provide, aluminum sediment bucket and clamping device. Provide 1/2-inch primer tap in P-trap and connect to trap primer.

2.08 CLEANOUTS

- A. Interior Service Floor Areas and Exterior Areas: Round coated cast iron floor cleanout with internal gasketed ABS cleanout plug and adjustable ABS housing with scoriated secured round satin nickel-bronze top; Josam 56010 Series.
- B. Interior Finishes Floor Areas: Square coated cast iron floor cleanout with internal gasketed ABS cleanout plug and adjustable ABS housing with secured scoriated square satin nickel-bronze top; Josam 56030 Series.
- C. Interior Finished Wall Areas: Round stainless steel wall access cover with center screw, coated cast iron cleanout tee with hub and spigot connection and recessed bronze tapped plug; Josam 58790 Series. Provide secured cover vandalproof screw.

2.09 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventer Assembly : ASSE 1013, USC FCCC HR, and CSA B64.5.
 - 1. 3/4-inch to 2-inch: Bronze body, modular design with replaceable seats, two independent check valves with intermediate relief valve, ball valve test cocks, 1/4-turn full port resilient seated bronze ball valves, bronze strainer, soft seated check valve; Watts No. 909QT with 601 check. Or Wilkins equal.
 - 2. 2-1/2 inch to 10-inch: Iron body, removable bronze seats, two independent check valves with intermediate relief valve, external sensing line, stainless steel internal parts, cast iron check valve bodies, 125 lb. cast iron strainer, and nonrising stem gate valve shutoffs; Watts No. 909S. Or Wilkins equal.

2.10 ESCUTCHEONS

- A. Provide escutcheons at finished surfaces where bare or insulated piping exposed to view passes through floors, walls or ceilings, except in boiler, utility or equipment rooms. Fasten securely to pipe or pipe covering. Provide satin finish, corrosion resisting steel, polished chromium-plated zinc alloy or polished chromium-plated copper alloy of the one-piece or split-pattern held in place by internal spring tension or setscrew.

2.11 PIPE DRAINS

- A. Provide 3/4-inch hose bibb with renewable seat and gate valve or full port ball valve

ahead of hose bibb. Provide 3/4-inch brass plugs or caps at other low points. Disconnection of supply piping at fixture will be acceptable.

2.12 WATER HAMMER ARRESTERS

- A. ASME A112.26.1M; sized in accordance with PDI WH-201, factory precharged suitable for operation in temperature range of minus 33 to 300 degrees F and maximum 250 pounds per square inch-gage working pressure; Watts No. 15.

2.13 HOSE BIBBS/HYDRANTS

- A. Hose Bibb: Chrome plated brass construction with hose thread spout, adjustable packing nut with deep stem guard, with vacuum breaker in accordance with ASSE 1011; Woodford Model No. 24P-3/4.
- B. Wall Hydrants (WH-A): ASSE 1019; concealed type, non-freeze, self-draining type with chrome plated brass casting, lockable recessed box, hose thread spout, stainless steel operating stem, removable key and vacuum breaker; Woodford Model No. B65.

2.14 TRAP PRIMERS

- A. 1 to 2 Floor Drains: Precision Plumbing Products P-2.
- B. 3 to 8 Floor Drains: Precision Plumbing Products P-1.
- C. Provide trap primer distribution unit for more than one drain trap.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Coordinate forming of floor construction to receive drains to required invert elevations.

3.02 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- F. Provide clearance for installation of insulation and access to valves.
- G. Provide access where valves and fittings are not exposed.
- H. Establish elevations of buried piping outside the building to be below "frost line," but not less than 18 inches.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.
- K. Establish invert elevations, slopes for drainage to 2% and the main building sewer line shall slope at 2%.
- L. Excavate and backfill in accordance with the mechanical general provisions.
- M. Install hub and plain end pipe with hub end upstream.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Use grooved mechanical couplings and fasteners only in accessible locations.
- P. Install unions downstream of valves and at equipment or apparatus connections.
- Q. Install brass male adapters each side of valves in copper pipe system. Sweat solder adapters to pipe.
- R. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- S. Install ball or butterfly valves for throttling, bypass, or manual flow control services.
- T. Provide spring loaded check valves on discharge of water pumps.
- U. Slope water piping and arrange to drain at all low points.
- V. Install piping parallel with or at right angles to walls unless otherwise shown on drawings.
- W. Conceal piping above ceiling, in walls or chases, etc., unless otherwise noted on the drawings.
- X. Bending of rigid piping is not permitted, only ells shall be utilized for a change in direction.
- Y. Temporarily plug or cap open ends of pipe at the end of each work day.
- Z. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- AA. Install roof drains and overflow drains using lead flashing, 4 pounds per square foot or heavier.

- BB. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- CC. Encase exterior cleanouts in concrete flush with grade.
- DD. Install water hammer arresters complete with accessible isolation valve.
- EE. Install water hammer arresters on hot and cold water lines at the end of each battery of plumbing fixtures and at each plumbing fixture which is located remote from a battery of fixtures.
- FF. Provide trap primers in cold water lines for traps. Tap trap primers off the top of the domestic water supply line.
- GG. Seismically brace new domestic water, gas, domestic hot water, waste, and storm drain piping per the SMACNA Seismic Restraint Manual Guidelines For Mechanical Systems.

3.03 SERVICE CONNECTIONS

- A. Connect to sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with backflow preventer, water meter with bypass valves and pressure reducing valve, as indicated.

END OF SECTION 15140

SECTION 15160

STORM DRAINAGE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Roof drains and storm piping within building and underground laterals within 5 feet of building.

1.03 RELATED SECTIONS

- A. Section 15050 - Electrical General Provisions, including trenching.
- B. Section 15060 - Hangers and Supports.
- C. Section 15083 - Piping Insulation.
- D. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. ASME B16.3 - Malleable Iron Threaded Fittings, Classes 150 and 300.
- B. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- C. ASTM A 74 - Cast Iron Soil Pipe and Fittings.
- D. ASTM A 234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- E. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- F. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
- G. AWWA C606 - Grooved and Shouldered Joints.
- H. CISPI 301 - Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
- I. CISPI 310 - Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.

1.05 SUBMITTALS

- A. Include data on pipe materials and pipe fittings.

PART 2 - PRODUCTS

2.01 STORM PIPING

A. Below Grade:

1. Cast Iron Piping and Fittings: ASTM A 74 service weight.
2. Joints: Hub-and-spigot, CISPI HSN compression type with CISPI 310 couplings, neoprene gaskets, or lead and oakum.

B. Above Grade:

1. Cast Iron Piping and Fittings: CISPI 301, service weight hubless.
2. Joints: CISPI 310, neoprene elastomeric compression type gaskets and stainless steel clamp-and-shield assemblies.
3. Contractor's Option:
 - a. Schedule 40 galvanized steel pipe with galvanized Victaulic Style 77 couplings.
 - b. Product: "No. 100", Gustin-Bacon.

2.02 STORM PRESSURIZED PIPING (FROM SUMP PUMP)

A. Below Grade:

1. Piping: Cast iron, AWWA C151.
2. Fittings: Ductile or gray iron, standard thickness with flanged or grooved ends.
3. Joints: AWWA C111, rubber gasket with 3/4 inch diameter rods or mechanical grooved couplings with a synthetic rubber gasket for pipe, AWWA C606.

B. Above Grade:

1. Piping: Black steel ASTM A 53, schedule 40.
2. Fittings: ASME B16.3, malleable iron, ASTM A 234 forged steel welding type, or pregrooved cast iron fittings.
3. Joints: Screwed up to 2 inches in size. Over 2 inches welded or mechanical joint coupling with zero flex for grooved piping.

2.03 ROOF DRAINS

A. Manufacturers:

1. Jay R. Smith.
2. Josam.
3. Tyler/Wade.
4. Zurn.

- #### B. Provide roof drains which have a coated cast iron body with clamping collar with integral gravel guard, adjustable extension, secondary clamping collar with o-ring and secured optional aluminum dome similar to Zurn Z-100EA. Provide optional underdeck clamp and roof sump receiver.

2.04 OVERFLOW DRAINS

A. Manufacturers:

1. Jay R. Smith.
2. Josam.
3. Tyler/Wade.
4. Zurn.

- B. Provide overflow drains which have a coated cast iron body with a non-adjustable 3 inch high water level regulator, with combination membrane flashing/clamp gravel guard, and optional aluminum dome similar to Zurn Z-103. Provide underdeck clamp and roof sump receiver.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation and access to valves and fittings.
- F. Establish elevations of buried piping outside the building to be below "frost line."
- G. Establish invert elevations, slopes for drainage to 1/8-inch per foot (1 percent) minimum above the floor. Maintain gradients.
- H. Excavate and backfill in accordance with Division 15 - Mechanical General Provisions.
- I. Install bell and spigot pipe with bell end upstream, below the floor.
- J. Insulate all horizontal piping and the underside of each roof drain body.

3.02 SERVICE CONNECTIONS

- A. Connect to existing storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

END OF SECTION 15160

SECTION 15184

REFRIGERATION PIPING AND SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.

1.03 RELATED SECTIONS

- A. Section 15083 - Piping Insulation.
- B. Section 15737 - Split System Air Conditioners.

1.04 REFERENCES

- A. UL - Underwriters Laboratory.

1.05 SUBMITTALS

- A. Include product data on pipe materials, pipe fittings, valves and accessories.
- B. Include schedule indicating manufacturer, model number, size, location, rated capacity and features for each specialty.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until use.

PART 2 - PRODUCTS

2.01 PIPING

- A. Copper Tubing: Type ACR, hard drawn.
 - 1. Fittings: Wrought copper with long radius elbows.
 - 2. Joints: Solder, Grade 95TA.

2.02 REFRIGERANT

- A. R-22.

2.03 MOISTURE AND LIQUID INDICATORS

- A. Single port type, UL listed with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap.

2.04 REFRIGERANT FILTER DRIER

- A. One direction flow for air conditioners with molded porous core to remove moisture and foreign matter from the refrigerant stream.

2.05 VALVES

- A. Diaphragm Packless Valves (Sizes 1-1/8 Inch and Smaller): UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends with positive backseating; for maximum working pressure of 500 pounds per square inch and maximum temperature of 275 degrees F.
- B. Packed Angle Valves (Sizes Over 1-1/8 Inch): Forged brass, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 pounds per square inch and maximum temperature of 275 degrees F.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs and clean joints bright with fine sandpaper and steel wool.
- B. Remove scale and dirt on inside and outside before assembly.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in an orderly manner, plumb and parallel to building structure and maintain gradient. Install piping in accordance with the recommendations of the refrigeration equipment manufacturer, including pipe sizes, refrigerant system evacuation and leak testing.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping 1 percent in direction of oil return.
- E. Provide non-conducting dielectric connections when joining dissimilar metals.

- F. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access to concealed valves and fittings.
- I. Prepare pipe, fittings, supports and accessories not pre-finished ready for finish painting.
- J. Insulate all liquid and suction piping.

3.03 APPLICATION

- A. Provide line size liquid indicators in main liquid line leaving condenser, or if receiver is provided, in liquid line leaving receiver.
- B. Provide replaceable cartridge filter-driers vertically in liquid line adjacent to receivers with three valve bypass assembly to permit isolation of driers for servicing.
- C. Provide refrigerant charging (packed angle) valve connections in liquid line between receiver shut-off valve and expansion valve.
- D. Utilize flexible connectors at or near compressors where piping configuration does not absorb vibration.

END OF SECTION 15184

SECTION 15190

FUEL PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Piping, fittings, valves, fuel oil pumps and tanks for fuel piping systems.

1.03 RELATED SECTIONS

- A. Section 02315 - Excavation and Fill: Product requirements for underground piping and tanks for placement by this section.
- B. Section 02320 - Backfill.
- C. Section 03300 - Cast-in-Place Concrete: Product requirements for concrete ballast and fill pads for underground tank for placement by this section.
- D. Section 08310 - Access Doors and Frames: Product requirements for Access Doors for placement by this section.
- E. Section 09910 - Paints: Product requirements for painting for placement by this section.
- F. Section 15075 - Mechanical Identification: Product requirements for valve and pipe identification for placement by this section.
- G. Section 16150 - Wire Connections and Devices: Execution requirements for electric connections specified by this section.

1.04 REFERENCES

- A. ACT 100 - Fabrication of FRP Clad/Composite Underground Storage Tanks.
- B. API Spec 12P - Fiberglass Reinforced Plastic Tanks.
- C. API 650 - Welded Steel Tanks for Oil Storage.
- D. API 1615 - Installation of Underground Petroleum Storage Systems.
- E. API 1632 - Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems.
- F. API 2000 - Venting Atmospheric and Low Pressure Storage Tanks.
- G. ASME SEC IX - Welding and Brazing Qualifications.

- H. ASME B16.3 - Malleable Iron Threaded Fittings.
- I. ASME B31.1 - Power Piping.
- J. ASME B31.4 - Liquid Petroleum Transportation Piping Systems.
- K. ASME B31.9 - Building Service Piping.
- L. ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings.
- M. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- N. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes.
- O. ASME B36.10 - Welded and Seamless Wrought Steel Pipe.
- P. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- Q. ASTM A 234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- R. ASTM D 2310 - Machine-Made Reinforced Thermosetting Resin Pipe.
- S. ASTM D 2513 - Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- T. ASTM D 2996 - Filament-Wound Reinforced Thermosetting Resin Pipe.
- U. ASTM D 4021 - Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks.
- V. AWS A5.8 - Brazing Filler Metal.
- W. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- X. NACE RP-01-69 - Control of External Corrosion on Underground or Submerged Piping Systems.
- Y. NACE RP-02-85 - Control of External Corrosion on Metallic Buried, Partially Buried or Submerged Liquid Storage Systems.
- Z. NFPA 30 - Flammable and Combustible Liquids Code.
- AA. NFPA 31 - Installation of Oil Burning Equipment.
- BB. NFPA 54 - National Fuel Gas Code.
- CC. NFPA 58 - Storage and Handling of Liquefied Petroleum Gases.
- DD. STI sti-P3 ACT-100 Specification for the Fabrication of FRP Clad/Composite Underground Storage Tanks.
- EE. UL 58 - Steel Underground Tanks for Flammable and Combustible Liquids.

FF. UL 80 - Steel Inside Tanks Oil-Burner Fuel.

GG. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids.

HH. UL 1316 - Glass-Fiber-Reinforced Plastic Underground Tanks for Petroleum Products.

II. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.05 DEFINITIONS

A. Where the designation GAS is used, it is the abbreviation for Natural Gas.

1.06 SUBMITTALS

A. Shop Drawings: Indicate tanks, system layout, pipe sizes, location, and elevations. For fuel oil tanks, indicate dimensions and accessories including manholes and hold down straps.

B. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Manufacturer's Installation Instructions: Submit oil pump data.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations of valves, piping system, storage tanks, and system components.

F. Operation and Maintenance Data: Submit installation instructions, spare parts lists.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with ASME SEC IX and NFPA 30, NFPA 31, NFPA 54, and NFPA 58.

B. Maintain one copy of each document on site.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

D. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience and approved by manufacturer.

1.08 PRE-INSTALLATION MEETING

A. Convene minimum one week prior to commencing Work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Provide temporary protective coating on cast iron and steel valves.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.12 WARRANTY

- A. Provide five-year manufacturer warranty for pumps and valves excluding packing.

1.13 EXTRA MATERIALS

- A. Supply two packing kits for each size valve.

PART 2 - PRODUCTS

2.01 See construction drawings.

2.02 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A 53 Schedule 40 black.
 - 1. Fittings: ASTM A 234/A234M forged steel welding type.
 - 2. Joints: ASME B31.1, ASME B31.2, ASME B31.9, ASME SEC 9, welded.
 - 3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.03 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A 53 Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A234M forged steel welding type.
 - 2. Joints: NFPA 54, threaded or welded to ANSI B31.1, ANSI B31.2, ANSI B31.9, ASME Sec 1.
- B. Copper Tubing: ASTM B 88, Type K annealed.
 - 1. Fittings: ASME B16.26 cast bronze.
 - 2. Joints: Flared.

2.04 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 inches and Under:
 - 1. Ferrous pipe: 150-pounds per square inch malleable iron threaded unions.
 - 2. Copper tube: 150-pounds per square inch bronze unions with brazed joints.

B. Pipe Size Over 2 inches:

1. Ferrous pipe: 150 pounds per square inch forged steel slip-on flanges; 1/16-inch thick preformed neoprene gaskets.
2. Copper tube: 150 pounds per square inch slip-on bronze flanges; 1/16-inch thick preformed neoprene gaskets.

2.05 PIPE HANGERS AND SUPPORTS

- A. Conform to NFPA 31, ANSI B31.1, ANSI B31.4.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- F. Vertical Support: [Angle ring.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.06 GATE VALVES

- A. Up To and Including 2 inches: MSS SP-80, Class 150, bronze body, bronze trim, rising stem, hand wheel, inside screw, solid wedge disc, threaded ends.
- B. 2 inches and Larger: MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, hand wheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.07 GLOBE VALVES

- A. Up To and Including 2 inches: MSS SP-80, Class 125, bronze body, bronze trim, hand wheel, bronze disc, threaded ends.
- B. 2 inches and Larger: MSS SP-85, Class 125, iron body, bronze trim, hand wheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.08 BALL VALVES

- A. MSS SP-110, Class 150, 400 pounds per square inch CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with threaded ends.

2.09 SWING CHECK VALVES

- A. Up to 2 inches: MSS SP-80, Class 125, bronze body and cap, bronze swing disc, threaded ends.
- B. 2 inches and Larger: MSS SP-71, Class 125, iron body, bronze swing disc, flanged ends.

2.10 RELIEF VALVES

- A. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated at maximum 60 pounds per square inch, UL listed for fuel oil and capacities ASME certified and labeled.

2.11 STRAINERS

- A. Threaded brass body for 175 pounds per square inch CWP Class 150, threaded, Y pattern with 1/32-inch stainless steel perforated screen.

2.12 FLEXIBLE CONNECTORS

- A. Bronze inner hose and braided exterior sleeve, suitable for minimum 200 pounds per square inch CWP and 250 degrees F.

2.13 FIRE STOP SYSTEMS

- A. General Purpose Fire Stopping Sealant: Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E 814 and UL 1479.
- B. General Purpose Vibration Resistant Fire Stopping Sealant: Silicone based, non slumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E 814 and UL 1479.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Excavate and Backfill in accordance with Section 02315.

3.03 EXISTING WORK

- A. Remove exposed abandoned tanks, including abandoned piping above accessible ceiling finishes. Cut flush with walls and floors, and patch surfaces.

- B. Disconnect abandoned and remove if raceway servicing them is abandoned and removed. Ensure access to existing and other installations which remain active and which require access. Modify installation or provide access panel as appropriate.
- C. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- D. Clean and repair existing which remain or are to be reinstalled.

3.04 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install to NACE RP-01-69.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Establish elevations of buried piping outside the building to ensure not less than 1.5 feet of cover.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Pipe vents from gas pressure reducing valves to outdoors and terminate in weatherproof hood.
- L. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.
- M. Identify piping systems including underground piping.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- P. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 7 inch wg

3.05 PIPE HANGER SPACING

A. Metal Piping:

1. Pipe size: 1/2 to 1-1/4 inches:
 - a. Maximum hanger spacing: 6.5 feet.
 - b. Hanger rod diameter: 3/8-inches.
2. Pipe size 1-1/2 to 2 inches:
 - a. Maximum hanger spacing: 10 feet.
 - b. Hanger rod diameter: 3/8-inch.
3. Pipe size: 2-1/2 to 3 inches:
 - a. Maximum hanger spacing: 10 feet.
 - b. Hanger rod diameter: 1/2-inch.
4. Pipe size: 4 to 6 inches:
 - a. Maximum hanger spacing: 10 feet.
 - b. Hanger rod diameter: 5/8-inch.
5. Pipe size: 8 to 12 inches:
 - a. Maximum hanger spacing: 14 feet.
 - b. Hanger rod diameter: 7/8-inch.

END OF SECTION 15190

SECTION 15410
PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Water closets, urinals, lavatories, sinks, service sinks, showers, and emergency eyewash.

1.03 RELATED SECTIONS

- A. Section 15060 - Hangers and Supports.
- B. Section 15140 - Domestic Water and Sanitary Drainage Piping.
- C. Section 15950 - Testing, Adjusting and Balancing.

1.04 SUBMITTALS

- A. Include fixtures, sizes, utility sizes, trim and finishes.
- B. Provide operation and maintenance manual.

1.05 QUALITY ASSURANCE

- A. Fixtures: By same manufacturer for each type product specified throughout unless noted otherwise.
- B. Trim: By same manufacturer for each product specified throughout unless noted otherwise.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store fixtures in shipping containers with labeling in place.
- B. Handle fixtures with care to insure against breakage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Fixtures:
 - 1. American Standard.
 - 2. Kohler.
 - 3. J.R. Smith.
 - 4. Elkay.

B. Fixture Trim:

1. Chicago.
2. Kohler.
3. Speakman.
4. Delta.
5. Zurn Industries.
6. Elkay.
7. Jay R. Smith

C. Flush Valves:

1. Sloan.
2. Zurn Industries.

D. Water Closet Seats:

1. Olsonite.

E. Fixture Carriers:

1. Jay R. Smith.
2. Josam.
3. Tyler/Wade.
4. Zurn Industries.

F. Wash Basins:

1. American Standard

G. Emergency Eyewash:

1. Guardian.
2. Haws.
3. Speakman.

2.02 See construction documents for plumbing fixtures

PART 3 - EXECUTION

3.01 INSPECTION

- A. Review millwork shop drawings. Confirm location with architectural drawings and size of fixtures and openings before rough-in and installation.
- B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.02 INSTALLATION

- A. Install each fixture with trap, unless noted otherwise on the drawings, easily removable for servicing and cleaning.

- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Division 7 - Waterproofing; color to match fixture.
- F. Mount fixtures to the following heights above finished floor:
 - 1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Handicapped: 17 to 19 inches to top of seat.
 - 2. Urinal:
 - a. Standard: 24 inches to top of bowl rim.
 - b. Handicapped: 17 inches to top of bowl rim.
 - 3. Lavatory Wall-Hung:
 - a. Standard: 31 inches to top of bowl rim.
 - b. Handicapped: 34 inches to top of bowl rim.
 - 4. Water Closet Flush Valves: 11 inches minimum above bowl rim, oriented away from adjacent wall at handicapped water closets.
- G. Provide wall and ceiling access panels for all valves, trap primers, water hammer arrestors, waste and vent clean outs, and where noted on drawings.

3.03 ADJUSTING AND CLEANING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- B. At completion clean plumbing fixtures and equipment.
- C. Solidly attach water closet carrier feet to floor with all screws, as recommended by manufacturer.

END OF SECTION 15410

SECTION 15480

DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Heat exchangers.
- B. Water heaters.
- C. Hot water generator.

1.03 RELATED SECTIONS

- A. Section 15060 - Hangers and Supports.
- B. Section 15070 - Vibration Isolation.
- C. Section 15082 - Equipment Insulation.

1.04 REFERENCES

- A. ASHRAE 90A - Water Heater Energy Efficiencies.
- B. ASME Section 8D - Pressure Vessels.
- C. NFPA 70 - National Electrical Code.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Submit heat exchanger dimensions, size of tappings, and performance data.
 - 2. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
- B. Certification: Include manufacturer's certificate that pressure vessels meet or exceed specified requirements.
- C. Provide operation and maintenance manuals for plumbing equipment.

1.06 QUALITY ASSURANCE

- A. Provide equipment with manufacturer's name, model number, and rating/capacity identified.

- B. Ensure products and installation of specified products are in accordance with recommendations and requirements of:
 - 1. American Gas Association (AGA).
 - 2. National Sanitation Foundation (NSF).
 - 3. American Society of Mechanical Engineers (ASME).
 - 4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - 5. National Electrical Manufacturers' Association (NEMA).
 - 6. Underwriters Laboratories (UL).

- C. Regulatory Requirements: Meet requirements of ASME Section 8D for manufacture of pressure vessels for heat exchangers.

PART 2 - PRODUCTS

2.01 GAS-FIRED WATER HEATER (RESIDENTIAL GRADE)

- A. Manufacturers:
 - 1. A. O. Smith.
 - 2. Lochinvar.
 - 3. Ruud/Rheem.
 - 4. State.

- B. Automatic, natural gas fired, vertical storage type with capacity and recovery rates as scheduled with 100 degrees F temperature rise, 150 pounds per square inch-gage maximum working pressure.

- C. Glass lined, welded steel tank; single flue passage, flue baffle and draft hood; thermally insulated with 2-inch thick glass fiber; encased in corrosion-resistant steel jacket with high-density magnesium anode; baked-on enamel finish; floor shield and legs.

- D. Automatic water thermostat with externally adjustable temperature range from 120 degrees F to 180 degrees F with high temperature cut-off set at 190 degrees F; built-in gas pressure regulator; cast iron or sheet metal burner; 100 percent safety shut-off pilot and thermocouple.

- E. Brass water connections and dip tube, drain valve, and ASME temperature and pressure relief valve.

- F. Provide with an automatic gas shut-off device to shut-off entire gas supply in event of excessive temperature in the tank.

- G. Provide with an AGA certified draft hood.

- H. Meet requirements of ASHRAE 90A for energy efficiencies and minimum energy factor required by Federal "National Appliance Energy Conservation Act of 1987."

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install tanks in accordance with manufacturer's instructions.
- B. Install unit with clearance for tube bundle removal without disturbing other installed equipment or piping.
- C. Pipe relief valves and drains to nearest floor drain.
- D. Support unit on pipe stand.
- E. Connect steam branch line from top of main. Pipe in flexible manner, pitched with steam flow, with pipe union connections. Provide steam pressure gage at exchanger inlet.
- F. Provide steam traps and valves as indicated. Pitch condensate return 1-inch in 20 feet (1:250) to return pump.

END OF SECTION 15480

SECTION 15530

LOW INTENSITY UNITARY HEATER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Forced-air furnaces.

1.03 RELATED SECTIONS

- A. Section 15810 - Ducts: Execution requirements for ductwork and duct liner specified by this section.
- B. Section 15820 - Duct Accessories: Execution requirements for flexible duct connections specified by this section.
- C. Section 16150 - Wire Connections and Devices: Execution requirements for electric connections specified by this section.

1.04 REFERENCES

- A. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
- B. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
- C. ARI 520 - Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units.
- D. ARI 610 - Central System Humidifiers for Residential Applications.
- E. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- F. ASHRAE 103-1982 - Heating Seasonal Efficiency of Central Furnaces and Boilers, Methods of Testing.
- G. NEMA MG 1 - Motors and Generators.
- H. NFPA 31 - Installation of Oil Burning Equipment.
- I. ANSI Z223.1-NFPA 54 - National Fuel Gas Code.
- J. NFPA 211 - Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances.
- K. UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical.
- L. UL 303 - Refrigeration and Air-Conditioning Condensing and Compressor Units.

M. UL 727 - Oil-Fired Central Furnaces.

N. UL 729 - Oil-Fired Floor Furnaces.

1.05 SUBMITTALS

- A. Product Data: Submit rated capacities, efficiencies, weights, required clearances, and location and size of field connections, accessories, electrical nameplate data, and wiring diagrams.
- B. Design Data: Indicate refrigerant pipe sizing.
- C. Manufacturer's Installation Instructions: Submit rigging, assembly, and installation instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of components and connections.
- F. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, service instructions, installation instructions, maintenance and repair data, and parts listing.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each document on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.07 PRE-INSTALLATION MEETING

- A. Convene minimum one week prior to commencing Work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept furnaces, condensing units and thermostats on site in factory packaging. Inspect for damage.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Provide five-year manufacturers warranty for heat exchangers.
- B. Provide five year manufacturers warranty for solid state ignition modules.

1.11 MAINTENANCE SERVICE

- A. Provide service and maintenance of furnace and accessories for one year from Date of Substantial Completion.

1.12 EXTRA MATERIALS

- A. Supply two pilot thermocouples for each furnace.

PART 2 - PRODUCTS

2.01 GAS FIRED FURNACES

A. Manufacturers:

1. Reznor.
2. ENERPAK
3. AAON.
4. GORDON ROBERTS.

- B. Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, heating element, controls, wired for single power connection with control transformer.

1. Air Flow Configuration: Horizontal.
2. Fuel: Natural gas fired.
3. Accessories: Per Equipment Schedule

- C. Heat Exchanger: The Indirect Fired Gas Heater section shall consist of the stainless steel primary and secondary heat exchanger with the power burner design. The basic design allows the power burner to inject the correct ratio of air and gas into the primary heat exchanger where the main combustion occurs. All components of the burner shall be mounted, wired, and fire tested prior to shipment from the manufacturer. The heated products of combustion shall pass through the multiple secondary tubes, heating each tube for maximum heat transfer. The products of combustion shall pass out of the inducer draft fan and through the flue.

- D. Gas Burner: The burner will be equipped for controlled modulated firing, including modulating damper motor, proportioning air damper fuel metering valves, end switch, solenoid valves and necessary linkage to assure proper air fuel ratio at all rates. The burner will be factory adjusted for a capacity turndown ratio of 3:1.

E. Gas Burner Safety Controls:

1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure
2. Flame rollout switch: Installed on burner box and prevents unsafe operation.

F. Operating Controls:

1. Room Thermostat: Cycles heating system on and off to maintain room temperature setting.
2. The unit is to include a 24-volt control transformer, a single-stage gas control system with a regulated combustion redundant gas valve and an intermittent spark

pilot with electronic flame supervision. The unit is to include all required limit and safety controls, including an energy cutoff (ECO) device on units with manual pilots and blocked vent shut-off systems.

3. All gas-fired duct furnaces shall bear a C.S.A. label.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that building is ready for installation of units and openings are as indicated on drawings.

3.02 INSTALLATION

- A. Install gas fired furnaces in accordance with ANSI Z223.1 (NFPA 54).
- B. Provide vent connections in accordance with NFPA 211 and ANSI Z223.1/NFPA 54.
- C. Connect furnace to gas fuel piping.
- D. Connect units to electric supply and connect controls that are intergraded with the air handling unit.

END OF SECTION 15530

SECTION 15550

FLUE PIPE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Flue pipe for gas fired equipment, including manufactured double-wall flue pipe.

1.03 REFERENCES

- A. ASHRAE Handbook - HVAC Systems and Equipment.
- B. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- C. NFPA 54 - National Fuel Gas Code.
- D. UL 103 -Factory-built Chimneys for Residential Type and Building Heating Appliances.
- E. UL 441 - Gas Vents.

1.04 DEFINITIONS

- A. Breeching: Vent connector.
- B. Flue Pipe: Vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.05 DESIGN REQUIREMENTS

- A. Comply with NFPA 211 and provide UL listing label for factory built vents used for venting natural draft appliances.

1.06 SUBMITTALS

- A. Include product data and shop drawings indicating size, required clearances, construction details and required supports.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of products specified in this Section with minimum ten years documented experience.
- B. Regulatory Requirements:
 - 1. Conform to NFPA 54 code for installation of natural gas burning appliances and equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Metalbestos.
- B. Rite-Vent.
- C. Or equal.

2.02 DOUBLE WALL METAL STACKS

- A. Provide double wall metal stacks, tested to UL 103 for use with building heating equipment, in compliance with NFPA 211.
- B. Fabricate with 1 inch minimum air space between walls. Construct inner jacket of 20 gage ASTM A 167 Type 316 stainless steel. Construct outer jacket of Type 316 stainless steel 24 gage for sizes 10 inches to 24 inches and 20 gage for sizes 28 inches to 48 inches.
- C. Provide accessories each bearing factory applied UL label.
 - 1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
 - 2. Exit Cone: Consists of inner cone, and outer jacket, to increase stack exit velocity 1.5 times.
 - 3. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

2.03 DOUBLE WALL GAS VENTS 6 INCHES AND SMALLER

- A. Fabricate inner pipe of sheet aluminum and outer pipe of galvanized sheet steel, tested in compliance with UL 441.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install in accordance with ASHRAE Handbook - HVAC Systems and Equipment and NFPA 54.
- C. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
- D. Level and plumb stacks. Provide guys and anchor as required.
- E. Clean stacks during installation, removing dust and debris.
- F. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of stacks.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

- A. The work of this Section will not be measured separately for payment but will be paid at the Contract lump sum price for Mechanical Work.

END OF SECTION 15550

SECTION 15732

PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Roof mounted, self-contained units, with electric cooling, and gas-fired electric or reverse refrigeration cycle (heat pump) heating and related controls; including:
 - 1. Packaged rooftop unit.
 - 2. Controls.
 - 3. Remote panel.
 - 4. Roof mounting frame and base.
 - 5. Maintenance service.

1.03 RELATED SECTIONS

- A. Section 07120 - Built-up Bituminous Waterproofing.
- B. Section 07130 - Sheet Waterproofing.
- C. Section 07140 - Fluid-Applied Waterproofing.
- D. Section 07170 - Bentonite Waterproofing.
- E. Section 15070 - Vibration Isolation.
- F. Section 15081 - Duct Insulation.
- G. Section 15862 - Air Filters.
- H. Section 15900 - Controls.
- I. Section 15950 - Testing, Adjusting and Balancing.
- J. Section 16220 - Motors and Controllers.

1.04 REFERENCES

- A. AGA - American Gas Association.
- B. ARI 210 - Unitary Air-Conditioning Equipment.
- C. ARI 240 - Air Source Unitary Heat Pump Equipment.
- D. ARI 270 - Sound Rating of Outdoor Unitary Equipment.

E. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.05 SUBMITTALS

- A. Include product data and schematic layouts showing condensing units, cooling coils, refrigerant piping and accessories required for complete system. Include complete pipe sizing data.
- B. Include rated capacities, dimensions, weights, accessories, required clearances, electrical requirements, wiring diagrams and location and size of field connections.
- C. Include manufacturer's installation instructions.
- D. Provide operation and maintenance manual.

1.06 MAINTENANCE SERVICE

- A. Furnish complete service and maintenance of packaged rooftop units for one year from date of substantial completion.
- B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24-hour emergency service on breakdowns and malfunctions.
- C. Include maintenance items as outlined in manufacturer's operating and maintenance data including minimum of six filter replacements, minimum of one fan belt replacement and controls checkout, adjustments and recalibrations.
- D. Submit copy of service call work order or report and include description of work performed.

1.07 EXTRA MATERIALS

- A. Provide one set of filters.

1.08 QUALITY ASSURANCE

- A. Provide units which are approved by AGA.

1.09 WARRANTY

- A. Provide five-year manufacturer's material replacement warranty for compressor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corp.
- B. AAON, Inc.
- C. Trane Co.

2.02 MANUFACTURED UNITS

- A. Provide roof mounted units complete with gas burner or electric heating elements and electric refrigeration as scheduled.
- B. Provide units which are self-contained, packaged, factory assembled and prewired consisting of insulated cabinet and frame, supply fan, heat exchanger and burner or electric heating elements, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.03 MATERIALS

- A. Cabinet: Galvanized steel with baked enamel finish, access doors or removable access panels, with quick fasteners, screwdriver operated flush cam type or locking door handle type with piano hinges. Provide structural members a minimum of 18 gage with access doors or removable panels a minimum of 20 gage.
- B. Insulation: 1 inch thick neoprene coated glass fiber on surfaces where conditioned air is handled. Protect edges from erosion.
- C. Heat Exchangers: Aluminized or stainless steel of welded construction.
- D. Supply Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley and rubber isolated hinge mounted motor or direct drive. Isolate complete fan assembly.
- E. Air Filters: 1-inch thick permanent washable.
- F. Roof Mounting Frame: 14-inch high galvanized steel channel frame with gaskets and nailer strips.

2.04 BURNER

- A. Gas Burner: Atmospheric type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shutoff, intermittent spark or glow coil ignition, flame sensing device and automatic 100 percent shutoff pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor and after air flow proven and slight delivery, allow gas valve to open.
- C. High Limit Control: Provide a temperature sensor with fixed stop at maximum permissible setting, which will de-energize the burner on excessive bonnet temperature, and energize the burner when temperature drops to lower safe value.
- D. Supply Fan Control: Provide temperature sensor sensing bonnet temperatures and independent of burner controls or adjustable time delay relays with switch for continuous fan operation.

2.05 EVAPORATOR COIL

- A. Provide copper or aluminum tube and aluminum fin assembly with galvanized drain pan and connection.

- B. Provide thermostatic expansion valves and alternate row circuiting for units 7-1/2 tons cooling capacity and larger.

2.06 COMPRESSOR

- A. Provide the compressor which is hermetic or semi-hermetic, 3600 rotations per minute maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter dryer.
- B. Delay compressor start with five minute timed off circuit.
- C. Provide outdoor thermostat which will energize compressor control circuit above 35 degrees F ambient.
- D. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve and solid state defrost control utilizing thermistors.
- E. Provide hot gas bypass or cycling compressors for capacity control.

2.07 CONDENSER

- A. Provide coil with copper or aluminum tube and aluminum fin assembly with subcooling rows.
- B. Provide condenser fans which are direct drive propeller fans, resiliently mounted with fan guard, motor overload protection wired to operate with compressor.
- C. Provide heat pressure control by refrigerant pressure switches cycling the condenser fans for unit operation down to 35 degrees F outdoor temperature.

2.08 SUPPLY/RETURN CASING

- A. Dampers: Provide outside, return and relief dampers with damper operator and control package to automatically vary outside air quantity.
- B. Gaskets: Provide tight fitting dampers with edge gasket, maximum leakage 5 percent at 2 inches WC pressure differential.
- C. Damper Operator: Provide 24 volt with gear train sealed in oil with spring return on units 7-1/2 tons cooling capacity and larger.

2.09 OPERATING CONTROLS - SINGLE ZONE UNITS

- A. Electric solid state microcomputer based room thermostat located as indicated in service area with remote sensor located as indicated.
- B. Incorporate the following in room thermostat:
 - 1. Automatic switching from heating to cooling.
 - 2. Preferential rate control to minimize overshoot and deviation from set point.
 - 3. Set-up for four separate temperatures per day.

4. Instant override of set point for continuous or timed period from one hour to 31 days.
5. Short cycle protection.
6. Programming based on weekdays, Saturday and Sunday.
7. Switch selection features including imperial or metric display, 12 or 24-hour clock, keyboard disable, remote sensor, fan ON-AUTO switch.

C. Include room thermostat display as follows:

1. Time of day.
2. Actual room temperature.
3. Programmed temperature.
4. Programmed time.
5. Duration of timed override.
6. Day of work.
7. System model indication: heating, cooling, auto, off, fan auto and fan on.
8. Stage (heating or cooling) operation.

2.10 PERFORMANCE

- A. Base performance on ARI 210 test conditions unless specified otherwise. Sound rating numbers are in accordance with ARI 270.
- B. Rated heating and cooling capacities shall be as scheduled on the drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting frame level.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide initial startup and shutdown during first year of operation including routine servicing and checkout.

END OF SECTION 15732

SECTION 15740

SPLIT SYSTEM HEAT PUMPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Unitary heat pumps and controls.

1.03 RELATED SECTIONS

- A. Section 15070 - Vibration Isolation: Product requirements for vibration isolators for placement by this section.
- B. Section 15820 - Duct Accessories: Product requirements for flexible connections for placement by this section.
- C. Section 15910 - Direct Digital Controls.
- D. Section 16150 - Wire Connections and Devices: Execution requirements for electrical connection to units specified by this section.
- E. Section 16220 - Motors and Controllers: Product requirements for electric motors for placement by this section.

1.04 REFERENCES

- A. ARI 210 - Unitary Air-Conditioning Equipment.
- B. ARI 240 - Air Source Unitary Heat Pump Equipment.
- C. ARI 270 - Sound Rating of Outdoor Unitary Equipment.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- B. Product Data: Submit drawings indicating dimensions, rough-in connections, and electrical characteristics and connection requirements. Provide capacity and dimensions of manufactured products and assemblies required for this Project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections. Provide data for manufactured products and assemblies. Indicate glycol, drain, thermostatic valves, and electrical rough-in connections with electrical characteristics and connection requirements.

- C. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of controls that are separate from units.
- F. Operation and Maintenance Data: Submit.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each document on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing Work of this Section with minimum three years documented experience and approved by manufacturer.

1.07 PRE-INSTALLATION MEETING

- A. Convene minimum one week prior to commencing Work of this Section.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept heat pump units on site in factory packaging. Inspect for damage.
- B. Protect terminal heat pump units from damage by providing temporary covers until construction is complete in adjacent space. Protect rooftop heat pump units from damage by storing off the roof until the roof mounting curbs are in place.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Provide five-year manufacturer's warranty for compressors.

1.11 MAINTENANCE SERVICE

- A. Provide service and maintenance of packaged heat pump roof top units for one year from Date of Substantial Completion. Include maintenance items as shown in manufacturer's operating and maintenance data, including filter replacements, fan belt replacement, and controls checkout and adjustments. Provide 24-hour emergency service on breakdowns and malfunctions.

1.12 EXTRA MATERIALS

- A. Supply one set of filters fan belts for each unit.

PART 2 - PRODUCTS

2.01 ELECTRIC HEATING COIL

- A. Helical nickel-chrome resistance wire coil heating elements with refractory ceramic support bushings] easily accessible with automatic reset thermal cut-out, built-in magnetic contactors, galvanized steel frame, control circuit transformer and fuse, manual reset thermal cut-out, airflow proving device, toggle switch, load fuses.
- B. Controls: Ensure supply fan is operating before electric elements are energized. Operate electric heater when outdoor ambient is too low to maintain space thermostat setting with compressor operation.

2.02 SPACE SUPPLY AIR COIL

- A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
- B. Provide capillary tubes or thermostatic expansion valves for units of 10 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 12 tons cooling capacity and larger.

2.03 COMPRESSOR

- A. Provide hermetic or semi-hermetic compressors, 3,600 rotations per minute maximum, resiliently mounted with positive lubrication, high and low pressure safety controls, motor overload protection, and section ports.
- B. Five-minute timed off circuit to delay compressor start.
- C. Outdoor thermostat to energize compressor above 35 degrees F ambient.
- D. Provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control.

2.04 OUTDOOR COIL

- A. Provide copper tube copper fin coil assembly with coil guard.
- B. Provide direct drive propeller fans, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
- C. Provide refrigerant pressure switches to cycle fans.

2.05 MIXED AIR CASING

- A. Dampers: Provide manual outside and return air dampers for fixed outside air quantity.

2.06 OPERATING CONTROLS - SINGLE ZONE UNITS

- A. Electric solid state microcomputer based room thermostat located as indicated.

B. Room thermostat shall incorporate:

1. Automatic switching from cooling to heat pump heating to supplemental electric heating.
2. Instant override of set point for continuous or timed period from one hour to 31 days.
3. Short cycle protection.
4. Programming based on weekdays, Saturday and Sunday.
5. Switch selection features including imperial or metric display, 12 or 24-hour clock, keyboard disable, remote sensor and fan-on-auto.

C. Room thermostat display shall include:

1. Time of day.
2. Actual room temperature.
3. Programmed temperature.
4. Programmed time.
5. Duration of timed override.
6. Day of week.
7. System model indication: cooling, heating, supplemental heating, auto, off, fan auto, fan on.
8. Stage (heating or cooling) operation.

D. Provide low limit thermostat in supply air to close outside air dampers and stop supply fan.

2.07 OPERATING CONTROLS

A. Provide low voltage, adjustable room thermostat to control heater stages in sequence with delay between stages, compressor and outdoor coil fan supply fan to maintain temperature setting.

1. Include system selector switch off-heat-auto-cool and fan control switch auto-on.
2. Provide double acting thermostat with minimum 1stage heating and 1 stage cooling.
3. Locate thermostat in room as shown.

2.08 UNITARY HEAT PUMP UNITS

A. Manufacturers:

1. Amana Refrigeration Inc.
2. American Standard Air Conditioning.
3. Armstrong Air Conditioning.
4. Carrier Corp.
5. Lennox International.
6. Trane.

B. Packaged, self-contained, factory assembled, pre-wired unit, consisting of cabinet, compressor, condensing coil, evaporator fan, evaporator coil, discharge plenum, outside air connection, heating coil, air filters, and controls; fully charged with refrigerant and filled with oil.

C. Assembly: Horizontal flow air delivery, in draw-through configuration as indicated.

D. Electrical Characteristics:

1. Disconnect Switch: Factory mount on equipment.

2.09 CABINET

- A. Frame and Panels: Galvanized steel with baked enamel finish, easily removed access-doors or panels.
- B. Insulation: Minimum 1/2-inch thick acoustic duct liner for lining cabinet interior.
- C. Drain Pan: Galvanized steel with corrosion-resistant coating or molded corrosion-resistant material.

2.10 SUPPLY AIR FAN

- A. Fan: V-Belt driven, with permanently lubricated bearings, statically and dynamically balanced, resiliently mounted.
- B. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Variable and adjustable pitch motor sheave selected so required rotations per minute is obtained with sheaves set at mid-position as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.

2.11 COMPRESSOR

- A. Hermetically sealed, 3,600 rotations per minute maximum resiliently mounted with positive lubrication and internal motor protection.

2.12 SUPPLY AIR COIL

- A. Direct expansion coiling coil of copper or aluminum tubes expanded into aluminum fins.
- B. Refrigeration circuit with expansion device, filter-drier, and charging valves.

2.13 AIR FILTERS

- A. Easily removed 2-inch thick disposable glass fiber panel filters.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locate remote panels where indicated.
- B. Connect controls to remote locations.
- C. Mount indoor units on vibration isolators.
- D. Connect indoor units to supply and return ductwork with flexible connections.

- E. Pipe refrigerant from indoor to outdoor unit.
- F. Pipe condensate from drain pan to condensate drainage system.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide initial start-up and shutdown during first year of operation, including routine servicing and checkout.
- B. Demonstrate unit operation and maintenance.

END OF SECTION 15740

SECTION 15810

DUCTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Ductwork.
- B. Supports.
- C. Duct cleaning.

1.03 RELATED SECTIONS

- A. Section 09910 - Paints.
- B. Section 15060 - Hangers and Supports.
- C. Section 15081 - Duct Insulation.
- D. Section 15820 - Duct Accessories.
- E. Section 15850 - Air Outlets and Inlets.
- F. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. ASHRAE - Handbook 1993 Fundamentals; Chapter 32 - Duct Design.
- B. ASHRAE - Handbook 1992 HVAC Systems and Equipment; Chapter 16 - Duct Construction.
- C. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- D. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- F. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
- G. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.
- H. UL 181 - Factory-Made Air Ducts and Air Connectors.

1.05 DEFINITIONS

- A. Duct Sizes: Sizes shown on Drawings are inside clear dimensions. For lined ducts the drawings duct size have already been increased for lining.

1.06 SUBMITTALS

- A. Indicate ductwork and fittings and gages, sizes, welds, and layout with bottom of duct elevation prior to start of work for duct systems.

1.07 QUALITY ASSURANCE

- A. Provide ductwork in accordance with NFPA 90A and NFPA 90B.
- B. Provide copy of SMACNA 1035 on site for use by site inspector.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Omni Duct.
- B. Peabody Spunstrand.
- C. Spiral Pipe of Texas, Inc.
- D. United-McGill Corporation.

2.02 MATERIALS

- A. Noncombustible, Class O in accordance with NFPA 90A or meeting requirements for Class 1 air duct materials in accordance with UL 181.
- B. Steel Ducts: ASTM A 653 or ASTM A 527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 ounce per square foot for each side.
- C. Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction or fabric supported by helically wound spring steel wire or flat steel bands; rated to 2 inches WG positive and 1-1/2 inches WG negative.
- D. Insulated Flexible Ducts: Flexible duct, wrapped with minimum 1-inch thick flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 "k" value at 75 degrees F.
- E. Fasteners: Rivets, bolts, or sheet metal screws for steel ducts. Weld joints in stainless steel ductwork.
- F. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded. In corrosive areas, use reinforced fiberglass coating on supports. Use double nuts and lock washers on threaded rod supports.

- G. Exposed Ductwork: Provide with coating to allow painting.
- H. Provide gage stamped on metal.

2.03 FITTINGS

- A. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide double thickness turning vanes. Provide turning vanes to prevent liner damage where acoustical lining is indicated.
- B. Increase duct sizes gradually, not exceeding 15-degree transition angle wherever possible not to exceed 45 degrees on concentric transitions and 30 degrees on eccentric transitions.
- C. Provide standard 45-degree entry takeoffs unless otherwise indicated as a 90-degree conical tee connection.

2.04 DUCTWORK

- A. Fabricate and support in accordance with SMACNA 1035 and ASHRAE Handbook Fundamentals and ASHRAE Handbook HVAC Systems and Equipment, except as indicated. Provide duct material, gages, and reinforcing for operating pressures indicated.
- B. Pressure Classifications:
 - 1. 2-inch WG positive or negative static pressure and velocities less than 2,000 feet per minute, SMACNA seal Class A on duct upstream from boxes.
 - 2. Round ducts in lieu of specific individual rectangular ductwork sizes shown on Drawings will not be allowed.
- C. Exposed Locations: Spiral duct.
- D. Provide easements where ductwork conflicts with piping and structure. Split into two ducts maintaining original duct area where easements exceed 20 percent of duct area.
- E. Connect flexible ducts to metal ducts with draw bands.
- F. Seal joints and seams by continuously embedding 4-inch wide strip of fiberglass cloth in mastic and covering with second layer of mastic.
 - 1. Mastic:
 - a. Miracle Adhesive D618.
 - b. Hardcast 601.
 - 2. Contractor's Option: "Ductmate".

PART 3 - EXECUTION

3.01 PROTECTION

- A. Provide temporary closures of metal or taped polyethylene on open ductwork during construction to prevent construction dust from entering ductwork system.

3.02 INSTALLATION

- A. Provide balancing dampers at points of supply, return, and exhaust where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
- B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw cap to ensure against air leakage. Extend tube to clear insulation.
- C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- D. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.
- E. Connect diffusers to low pressure ducts with 5-foot maximum length of flexible duct. Hold in place with strap or clamp.
- F. Support ductwork in accordance with SMACNA requirements. Seismically brace ductwork in accordance with SMACNA Seismic Restraint Manual Guidelines For Mechanical Systems.
- G. Adhere to Drawings as closely as possible. If approved by A/E, run and shape of ducts may vary and offsets may be made during progress of work, if required to meet structural or other interferences.
- H. Fabricate ducts to prevent seams of joints being cut for installation of grilles, registers, or outlets.
- I. Reinforce ducts to prevent buckling, breathing, vibrations, or unnecessary noises, as during start-up, shutdown, and continuous operation of air handling system, reinforcing shall be as recommended in ASHRAE Guide and Data Book and SMACNA 1035.

3.03 PAINTING

- A. Paint exposed ductwork per the direction of the A/E.

3.04 ADJUSTING AND CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.05 DUCTWORK APPLICATION SCHEDULE

Air System	Material
Supply	Galvanized Steel
Return and Relief	Galvanized Steel
Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel
Ventilation	Galvanized Steel

3.06 DUCTWORK PRESSURE CLASSIFICATION SCHEDULE

- A. All ductwork shall be constructed for a 2 inch pressure classification.

END OF SECTION 15810

SECTION 15820
DUCT ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Volume control dampers.
- B. Combination fire and smoke dampers.
- C. Backdraft dampers.
- D. Flexible duct connections.
- E. Duct access doors.
- F. Duct test holes.

1.03 RELATED SECTIONS

- A. Section 15070 - Vibration Isolation.
- B. Section 15081 - Duct Insulation.
- C. Section 15810 - Ducts.
- D. Section 15850 - Air Outlets and Inlets.

1.04 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.
- C. UL 33 - Heat Responsive Links for Fire-Protection Service.
- D. UL 555 - Fire Dampers.
- E. UL 555S - Safety Leakage Rated Dampers for Use in Smoke Control Systems.

1.05 SUBMITTALS

- A. Include shop drawings for shop fabricated assemblies indicated, including volume control dampers, duct access doors, and duct test holes. Provide product data for hardware used.
- B. Combination Fire and Smoke Dampers: Provide UL installation drawing.

- C. Include manufacturer's installation instructions.
- D. Provide operation and maintenance manual.

PART 2 - PRODUCTS

2.01 VOLUME CONTROL DAMPERS (MVD)

- A. Fabricate in accordance with SMACNA 1035 and as indicated.
- B. Provide balancing dampers downstream of duct splits where possible, provide splitters, if not possible. Fabricate splitter dampers of material same gage as duct to 24-inch size in either direction, and two gages heavier for sizes over 24 inches. Fabricate splitter dampers of sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/4-inch diameter rod in self aligning, universal joint action flanged bushing with set screw.
- C. Fabricate single blade dampers for duct sizes to 12 inches high by 30 inches wide.
- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes, 12 inches high by 48 inches wide. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Provide end bearings except in round ductwork 12 inches and smaller. Provide oil-impregnated nylon or sintered bronze bearings on multiple blade dampers.
- F. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Provide regulator at both ends where rod lengths exceed 30 inches.
- G. Mount quadrant regulators on stand-off mounting brackets, bases, or adapters on insulated ducts.

2.02 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, and UL 555S for dynamic closure under flow and pressure for the designed systems, and as indicated.
- B. Provide factory sleeve for each damper. Provide damper operator on exterior of sleeve and link to damper operating shaft.
- C. Fabricate with multiple blades with stainless steel sleeve bearings.
- D. Provide operators of the spring return, pneumatic type, suitable for operation on 0 to 20 pounds per square inch-gage instrument air or electric type suitable to operate on voltage indicated on Drawings. Provide UL-listed and labelled operators. Provide end switches to indicate damper position. Provide 165 degree F fusible link.
- E. Fire Rating: 1-1/2 hours.

2.03 BACKDRAFT DAMPERS

- A. Gravity backdraft dampers, size 18 inches by 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.
- B. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of 16 gage galvanized steel, with center pivoted blades of maximum 6-inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.04 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA 1035.
- B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 ounce per square yard, approximately 6 inches wide, crimped into metal edging strip. Provide electrical bonding jumpers across flexible connection.

2.05 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA 1035 unless otherwise indicated. Fabricate doors of the same material as the duct construction.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close-fitting doors with sealing gaskets and quick fastening locking devices. Provide minimum 1-inch thick insulation with sheet metal cover for insulated ductwork.
- D. Access doors smaller than 12 inches square may be secured with sash locks.
- E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 inches by 48 inches. Provide additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners will not be acceptable.

2.06 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Provide factory fabricated permanent test holes, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 INTAKE SCREENS

- A. Provide 1/2-inch by 1/2-inch galvanized screen mounted in heavy-duty galvanized frame for outside air connections and return air connections without return grilles.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers to achieve required air flow quantities.
- C. Provide combination fire and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Demonstrate resetting of fire dampers to authorities having jurisdiction and A/E.
- E. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8-inch by 8-inch size for hand access, 18-inch by 18-inch size for shoulder access.
- H. Provide duct test plugs at inlet and outlet of equipment for testing and balancing purposes.
- I. Provide volume control dampers on each branch duct leading to each air outlet whether indicated on Drawings or not.
- J. Provide required straight sections of duct upstream and downstream of flow measuring devices. Refer to manufacturer's data for required dimensions.
- K. Dampers shall be 100 percent open prior to beginning testing and balancing.

3.02 PAINTING

- A. Paint exposed ductwork and devices, excluding flexible connections per the direction of the A/E.

END OF SECTION 15820

SECTION 15834
CENTRIFUGAL FANS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Centrifugal fans for mechanical systems and associated items normally found with fan installation; including:
 - 1. Backward inclined centrifugal fans.
 - 2. Inline centrifugal fans.
 - 3. Motors and drives.
 - 4. Belt guards.
 - 5. Inlet/outlet screens.
 - 6. Access doors.
 - 7. Scroll drains.

1.03 RELATED SECTIONS

- A. Section 15060 - Hangers and Supports.
- B. Section 15070 - Vibration Isolation.
- C. Section 15810 - Ducts.
- D. Section 15900 - Controls.
- E. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 - Method of Calculating Fan Sound Ratings from Laboratory Test Data.
- E. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- F. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- G. SMACNA 1035 - HVAC Duct Construction Standard - Metal and Flexible.

1.05 SUBMITTALS

- A. Include fan curves with specified operating point clearly plotted.
- B. Include sound power levels for both fan inlet and outlet at rated capacity.
- C. Indicate special coating when required.
- D. Provide operation and maintenance manual.

1.06 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acme Fan.
- B. U.S. Fan International.
- C. Cook Fan.
- D. Trane Company.

2.02 GENERAL

- A. Select fans such that they do not increase motor size, increase noise level, or increase tip speed by more than 10 percent, or increase inlet air velocity by more than 20 percent, from specified criteria. Provide fans capable of accommodating static pressure variations of plus 10 percent.
- B. Base performance on sea level conditions.
- C. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas.
- D. Coat all parts of fan housing, blades, etc., exposed to corrosive air stream with specified material.

2.03 WHEEL AND INLET

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy backplate, backwardly curved blades welded or riveted to flange and backplate; cast-iron or cast steel hub riveted to backplate and keyed to shaft with set screws and key.

2.04 HOUSING

- A. Heavy gage steel, spot welded for AMCA 99 designated Classes I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut-off.
- B. Factory finish before assembly with enamel or prime coat. For fans handling air downstream of humidifiers, fabricate of galvanized steel. Prime coating on aluminum parts is not required.
- C. Provide bolted construction with horizontal flanged split housing.
- D. Fume Hood Fan Housing: Cast iron with three coats of air dried Heresite. Apply Heresite to all parts of the fan housing both internal and external.
- E. Corrosive Resistant Housing: PVC or fiberglass.

2.05 MOTORS AND DRIVES

- A. Motors: As indicated, in compliance with section on motors, this division.
- B. Bearings: AFBMA 9, L-50 life at 100,000 hours heavy duty pillow block type, self-aligning, grease-lubricated ball bearings, or AFBMA 11 L-50 life at 400,000 hours pillow block type, self-aligning, grease-lubricated roller bearings.
- C. Shafts: Hot rolled steel, ground and polished, with key-way, protectively coated with lubricating oil. Provide 316 stainless steel shafts for corrosive applications.
- D. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves selected so required rotations per minute is obtained with sheaves set at mid-position. Include an additional set of drives for each fan to be used for final adjustments. After correct speed has been determined with variable sheave, provide two belts.
- E. Belt Guard: Fabricate to SMACNA 1035; of 12 gage 3/4-inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.06 ACCESSORIES

- A. Inlet/Outlet Screens: Galvanized steel welded grid.
- B. Access Doors: Shaped to conform to scroll with quick opening latches and gaskets.
- C. Cover: Provide weatherproof cover for motor and drive where fans are exposed to the weather.
- D. Provide back draft damper.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
- B. Install fans as indicated or specified with resilient mountings and flexible electrical leads.
- C. Install flexible connections specified in section on ductwork accessories between fan inlet and discharge ductwork. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- D. Install fan restraining snubbers. Install flexible connectors so that they are not in tension while running.
- E. Provide variable sheaves required for final air balance.
- F. Provide safety screen where inlet or outlet is exposed.
- G. Provide backdraft dampers on discharge of exhaust fans and as indicated.
- H. Install roof mounted fans on factory curbs.

3.02 PAINTING

- A. Provide fans with factory finish in accordance with the manufacturer's standard. Touch up scratches and marks from handling and placement of equipment with masking enamel to match manufacturer's color.
- B. Where exhaust fans are required to have Heresite coating, have units factory finished with required number of coats prior to shipping to the job site.

END OF SECTION 15834

SECTION 15836
POWER VENTILATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Furnish and install roof and wall exhausters and cabinet and ceiling exhaust fans for mechanical systems.

1.03 RELATED SECTIONS

- A. Section 15060 - Hangers and Supports.
- B. Section 15070 - Vibration Isolation.
- C. Section 15810 - Ducts.
- D. Section 15834 - Centrifugal Fans.
- E. Section 15950 - Testing, Adjusting and Balancing.
- F. Section 16220 - Motors and Controllers.

1.04 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
- E. SMACNA - Low Pressure Duct Construction Standard.

1.05 SUBMITTALS

- A. Include fan curves with specified operating point clearly plotted.
- B. Include sound power levels for both fan inlet and outlet at rated capacity.
- C. Indicate special coating when required.
- D. Provide operation and maintenance manual.

1.06 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acme.
- B. Carnes.
- C. Cook.
- D. Penn.

2.02 ROOF EXHAUSTERS

- A. Centrifugal or Axial Fan Unit: Backward inclined or airfoil design, v-belt or direct driven, with spun aluminum housing; resilient mounted motor and drive assembly; 1/2-inch mesh, 16 gauge aluminum birdscreen; square base to suit roof curb with continuous curb gaskets; secured with cadmium plated or stainless steel bolts and screws.
- B. Roof Curb: 12 inch high with continuously welded seams, built-in cant strip, 1 inch insulation and curb bottom, hinged curb adapter and factory installed door nailer strip. Where scheduled, provide interior baffle with acoustic insulation and increase curb height as required.
- C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- D. Backdraft Damper: Gravity activated, aluminum multiple blade construction, felt edged with nylon bearings.
- E. Sheaves: Cast-iron or steel, dynamically balanced, bored to fit shafts and keyed; adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; and will not overload motor when adjusted to maximum pitch; fan shaft with self-aligning pre-lubricated ball bearings.
- F. Apply three coats of air dried Heresite coating both internal and external to all roof exhausters from corrosive areas.

2.03 WALL EXHAUSTERS

- A. Centrifugal or Axial Fan Unit: V-belt or direct driven, with spun aluminum housing; resiliently mounted motor and drive assembly; 1/2-inch mesh 16 gauge aluminum or

galvanized steel bird screen; secured with cadmium plated or stainless steel bolts and screws.

- B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- C. Backdraft Damper: Gravity activated, aluminum construction, felt edged with nylon bearings.
- D. Sheaves: For V-belt drives, provide cast iron or steel, dynamically balanced, bored to fit shafts and keyed; adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with lag screws to roof curb.
- C. Install flexible ductwork connections when fan connects to ductwork.
- D. Provide all ventilating and exhaust fans with integral vibration isolation or mount or suspend unit with vibration isolators.

3.02 PAINTING

- A. Provide equipment with factory finish in accordance with the manufacturer's standards. Touch up scratches and marks from handling and installation with masking enamel to match manufacturer's color.
- B. Where exhaust fans are required to have Heresite coating, have units factory finished with required number of coats prior to shipping to the job site.

END OF SECTION 15836

SECTION 15837

VEHICLE EXHAUST SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Exhausters, hoses, and fittings for overhead vehicle exhaust system.

1.03 RELATED SECTIONS

- A. Section 15070 - Vibration Isolation.
- B. Section 15810 - Ducts.
- C. Section 15820 - Duct Accessories.
- D. Section 15834 - Centrifugal Fans.

1.04 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

1.05 SUBMITTALS

- A. Include fan curves with specified operating point clearly plotted.
- B. Include sound power levels for both fan inlet and outlet at rated capacity.
- C. Indicate special coating when required.
- D. Provide operation and maintenance manual.
- E. Provide certification that installer is a factory certified installer.

1.06 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.

- C. Fabrication: Conform to AMCA 99.
- D. Installation: Entire vehicle exhaust system shall be installed by a factory certified installer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Carmon Products.
- B. Plymovent.
- C. Nederman.
- D. See contract documents equipment schedule.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure exhaust fan to wall frame with bolts.
- C. Install flexible ductwork connections when fan connects to ductwork and hose.
- D. Provide exhaust fans with integral vibration isolation or mount or suspend unit with vibration isolators.
- E. Provide Type 304 stainless steel ductwork from hose to fan and from fan to wall vent.

3.02 PAINTING

- A. Provide equipment with factory finish in accordance with the manufacturer's standards. Touch up scratches and marks from handling and installation with matching resin.

END OF SECTION 15837

SECTION 15850

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Wall, and ceiling diffusers, registers and grilles, louvers, and roof vents.

1.03 RELATED SECTIONS

- A. Section 15810 - Ducts.
- B. Section 15820 - Duct Accessories.
- C. Section 15950 - Testing, Adjusting and Balancing.

1.04 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- D. ARI 650 - Air Outlets and Inlets.
- E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- F. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.

1.05 SUBMITTALS

- A. Include product data for outlets and inlets indicating type, size, location, application, and noise level.
- B. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- C. Include manufacturer's installation instructions.

1.06 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate performance of louvers in accordance with AMCA 500.

- C. Conform to NFPA 90A.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Ceiling Diffusers:

1. Tuttle & Bailey.
2. Krueger Manufacturing Company.
3. Titus Products.

B. Louvers:

1. Airolite.
2. Ruskin.

C. Roof Vents:

1. ACME.
2. Cook.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Rectangular, adjustable pattern, stamped, multicore type diffuser to discharge air in 360-degree pattern with sectorizing baffles where indicated.
- B. Provide surface mount type frame. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabricate of steel with baked enamel off-white finish.
- D. Provide radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.03 PERFORATED FACE CEILING DIFFUSERS

- A. Perforated face with fully adjustable pattern and removable face.
- B. Provide surface mount type frame. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabricate of steel with steel or aluminum frame and baked enamel off-white finish.
- D. Provide radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.04 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

- A. Fixed grilles of 1/2-inch by 1/2-inch by 1/2-inch louvers.

- B. Fabricate 1 inch margin frame with countersunk screw mounting for gypsum board ceiling or lay-in frame for suspended grid ceilings.
- C. Fabricate of aluminum with factory baked enamel finish.
- D. Where not individually connected to exhaust fans, provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.05 WALL SUPPLY REGISTERS/GRILLES

- A. Streamlined and individually adjustable blades, depth of which exceeds 3/4-inch maximum spacing with spring or other device to set blades, vertical face, double deflection.
- B. Fabricate 1-inch margin frame with countersunk screw mounting and gasket.
- C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.06 WALL EXHAUST AND RETURN REGISTERS/GRILLES

- A. Streamlined blades, depth of which exceeds 3/4-inch spacing, with spring or other device to set blades, vertical face.
- B. Fabricate 1-inch margin frame with countersunk screw mounting.
- C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Where not individually connected to exhaust fans, provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.07 DOOR GRILLES

- A. V-shaped louvers of 20 gage steel, 1 inch deep on 1/2-inch centers.
- B. Provide 20 gage steel frame with auxiliary frame to give finished appearance on both sides of door, with factory prime coat finish.

2.08 LOUVERS

- A. Provide 6-inch deep louvers with blades on 45-degree slope with center baffle and return bend, heavy channel frame, birdscreen on interior side with 1/2-inch square mesh for exhaust and 3/4-inch for intake.
- B. Fabricate of 12 gage extruded aluminum, welded assembly, with factory prime coat finish.
- C. Furnish with exterior angle flange for installation.

- D. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
- E. Pass 750 feet per minute free velocity with less than 0.10 inches of water pressure drop, based in accordance with AMCA 500. Water penetration less than 0.025 ounce of water per foot of free area at 900 feet per minute. Provide a minimum of 45 percent free area.

2.09 ROOF VENTS

- A. Fabricate air inlet or exhaust hoods in accordance with SMACNA 1035, Class 1 inch, Duct Construction Standards.
- B. Fabricate of galvanized steel, minimum 16 gage base and 20 gage hood, or aluminum, minimum 16 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2-inch square mesh for exhaust and 3/4-inch for intake, and factory prime coat finish.
- C. Mount unit on minimum 12-inch high curb base with insulation between duct and curb.
- D. Make hood outlet area minimum of twice throat area.

2.10 GOOSENECKS

- A. Fabricate in accordance with SMACNA 1035, Class 1 inch, of minimum 18 gage galvanized steel.
- B. Mount on minimum 12-inch high curb base where size exceeds 9-inch by 9-inch.

2.11 CORROSION PROTECTION

- A. Coat all inlets and outlets in corrosive areas with two coats air dried Heresite.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturers' instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.

- F. Provide all specialties and frames for air devices required for installation in ceiling type indicated in architectural documents. Provide all cutting and patching of T-bars, gypsum board and other ceiling systems as required for installation of air devices.

END OF SECTION 15850

SECTION 15862

AIR FILTERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Disposable panel filters.
- B. Filter frames.
- C. Filter gages.

1.03 RELATED SECTIONS

- A. Section 15732 - Package Rooftop Air Conditioning Units.
- B. Section 15740 - Split System Heat Pumps.
- C. Section 15810 - Ducts.

1.04 REFERENCES

- A. UL 900 - Test Performance of Air Filter Units.
- B. ASHRAE 52 - Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter.

1.05 SUBMITTALS

- A. Include filter media, filter performance data, filter assembly and filter frames.
- B. Provide operation and maintenance manual.

1.06 QUALITY ASSURANCE

- A. Provide filter media that is UL 900 listed, Class 1 or Class 2, as approved by local authorities.
- B. Provide all filters as product of one manufacturer.
- C. Assemble filter components to form filter banks from products of one manufacturer.

1.07 EXTRA MATERIALS

- A. Provide two spare sets of disposable panel filters at project final acceptance for each piece of equipment requiring filters.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. American Air Filter.
- B. Cam-Farr.
- C. Continental.
- D. Owens Corning.

2.02 DISPOSABLE PANEL FILTERS

- A. Media: 2-inch thick fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive. Provide industry standard sizes as required for installation.
- B. Rating: 500 feet per minute face velocity, 0.15-inch WG initial resistance, 0.50-inches WG recommended final resistance.
- C. Provide filter media in permanent removable frames.
- D. Holding Frames: 20 gage minimum galvanized steel frame with expanded metal grid on outlet side and steel rod grid on inlet side, hinged with pull and retaining handles.

2.03 FILTER FRAMES

- A. Fabricate filter frames and supporting structures of 16 gage galvanized steel or extruded aluminum T-section construction with necessary gasketing between frames and walls.
- B. Standard Sizes: Provide for interchangeability of filter media of other manufacturers; for panel filters, size for required installation of filter media minimum 2 inch thick; for extended surface and high efficiency particulate filters, provide for upstream mounting.
- C. Side Servicing Housings: Flanged for insertion into ductwork, of reinforced 16 gage galvanized steel; access doors with continuous gasketing and positive locking devices on both sides; extended aluminum tracks or channels for primary and secondary filters with positive sealing gaskets.

2.04 FILTER SECTIONS

- A. Inclined Manometer: One piece molded plastic with epoxy coated aluminum scale, inclined-vertical indicating tube and built-in spirit level, range 0 inches to 5 inches WG, 3 percent of full scale accuracy.
- B. Accessories: Static pressure tips with integral compression fittings, 1/4-inch aluminum tubing, two-way or three-way vent valves.
- C. Inclined Manometer used for Enthalpy Wheel unit.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Do not operate fan system until filters temporary or permanent are in place. Replace temporary filters used during construction.
- D. Install filter gage static pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level. Used on Enthalpy Wheel unit.
- E. Provide inclined gage manometer with red gage oil at filter bank of Enthalpy Wheel unit. Provide at least 2 ounces of red gage oil for replacement in each manometer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

- A. The work of this Section will not be measured separately for payment but will be paid at the Contract lump sum price for Mechanical Work.

END OF SECTION 15862

SECTION 15900

CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Automatic temperature controls, control and instrumentation equipment, automation equipment, and installation of electric/electronic control. Provide system of controls that will completely accomplish implied or intended functions of control system as shown on Drawings and as specified.

1.03 RELATED SECTIONS

- A. Section 15530 - Low Intensity Unitary Heater.
- B. Section 15732 - Package Rooftop Air Conditioning Units.
- C. Section 15740 - Split System Heat Pumps.
- D. Section 15834 - Centrifugal Fans.
- E. Section 15836 - Power Ventilators.
- F. Section 15837- Vehicle Exhaust System.
- G. Section 16132 - Conduit.

1.04 SUBMITTALS

- A. Include manufacturer's certified rating data, description literature, catalog cuts, and shop drawings, for proposed:
 - 1. Control devices and equipment.
 - 2. Control dampers and valves.
 - 3. Control panels.
 - 4. Programmable Thermostat.
- B. Include control and interlock wiring diagrams and descriptions on operation of all control systems and their effect on other equipment and systems.
- C. A review of any submittal, which results in a requirement for Contractor to resubmit, shall not be justified basis for work delay or additional compensation.
- D. Arrange a non-disclosure agreement with the manufacturers to permit the Owner to obtain and use documentation on the system of software.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Honeywell.
- B. Johnson Controls.
- C. KELE.
- D. Or Equal.

2.02 MATERIALS

- A. It is the intention of this portion of the specifications to set a minimum standard of quality for all equipment and devices used in the control system and at the various control panels. Any reference to any equipment item, control system or panel shall be construed to apply equally to all similar items, systems or panels as may be applicable in the opinion of A/E. All hardware employed within this system shall be of the "first quality" grade. Equipment shall be selected on the basis of durability, serviceability and function. Provide only UL listed equipment.
- B. The equipment furnished under this section of the specifications shall be supplied as a complete system produced under the responsibility of the controls contractor utilizing all of the various components specified to meet the function and accuracies described within this section of the specifications.

2.03 AUTOMATIC TEMPERATURE CONTROL EQUIPMENT

- A. Programmable Thermostats:
 - 1. The occupied mode is required to be activated before heating and cooling set points can be maintained.
 - 2. Both the heating and cooling set points shall be independently adjustable in such a manner that the temperature difference between heating and cooling set points develops an energy dead band. When the space temperature is within the dead band, neither heating nor cooling energy is added to the space. The supply fan runs continuously during occupied mode. Protective Guards: Provide on all thermostats in corridors, lobbies, meeting rooms, toilet rooms, instruction rooms and similar areas with vandal proof screws and finished in color selected by A/E.
- B. Electric solid state microcomputer based wall mounted room thermostat, located as indicated at a height of 48 inches above the floor.
- C. Room thermostat shall incorporate:
 - 1. Automatic switching from cooling to heating.
 - 2. Instant override of set point for continuous or timed period from one hour to 31 days.
 - 3. Short cycle protection.
 - 4. Programming based on weekdays, Saturday and Sunday.
 - 5. Switch selection features including imperial or metric display, 12 or 24-hour clock, keyboard disable, and fan-on-auto switch.

- D. Room thermostat display shall include:
1. Time of day.
 2. Actual room temperature.
 3. Programmed temperature.
 4. Programmed time.
 5. Duration of timed override.
 6. Day of week.
 7. System model indication: cooling, heating, auto, off, fan auto, fan on. Stage (heating or cooling) operation.
- E. Smoke Detectors: Powered by Division 16 furnished and installed in ducts or equipment by Division 15.
- F. Firestats: Manual reset type with an adjustable temperature cut-off initially set at 135 degrees F. Provide firestats rated as necessary to handle the various fans to which connected to. Provide at each air handling unit and at each fan throughout the project. Where fans are interlocked with other equipment, actuation of any single firestat shall deactivate the entire system and energize the alarm system.
- G. Control Dampers: Provide all outside, return, supply and exhaust controls, parallel acting type with spring return operators and with gasketed edges. Dampers to restrict leakage to 7.2 CFM per square foot at 1 inch water gage and 14.0 CFM per square foot at 4 inches water gage. Provide all motorized dampers powered open and on loss of power closed.
- H. Electrical Wiring: Beyond that furnished under Division 16, provide herein as necessary to accomplish the intent and operations called out. Use cables and/or individual conductors; however, each wire within a cable separately identify/separately color code from all other wires within that cable. Color coding may be repeated in other cables, except that identical cables shall be separately identifiable by coding of the cable. Provide conductors encased in a continuous "Mylar" sheath where cables are used. Wire sizes for trunk cables shall be not less than No. 16 AWG stranded for system selection power, No. 22 AWG solid shielded for intercom, No. 20 AWG solid sheathed for thermocouples and No. 19 AWG for humidity indication and for function selection initiation and operation. Provide premium grade (plus or minus 3/4 degree F) copper constantan for thermocouple wire in cables. Provide 0.16 PVC minimum and cable jackets 0.040 minimum for insulation for individual wires.
- I. Nameplates: Secure to all switches, indicating lights and control devices (self-tapping screws or bolts) to identify the items. Provide engraved laminated plastic, black nameplates with white letters.
- J. Start-Stop Push Buttons: Maintain or momentary to perform the required functions (Green: On; Red: Off).

END OF SECTION 15900

SECTION 15910

GAS MONITORING SYSTEM CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Control equipment and software.

1.03 RELATED SECTIONS

- A. Section 16150 - Wire Connections and Devices: Execution requirements for electric connections specified by this section.

1.04 REFERENCES

- A. ASME MC85.1 - Terminology for Automatic Control.

1.05 SYSTEM DESCRIPTION

- A. Automatic controls field monitoring and control system using field programmable microprocessor based units.
- B. Base system on distributed system of fully intelligent, stand-alone controllers and interconnecting wire and conduit.
- C. Include installation and calibration, supervision, adjustments, and fine-tuning necessary for complete and fully operational system.
- D. The Gas Monitoring System (GMS) operates as a stand-alone, autonomous system, monitoring ambient methane, propane, carbon monoxide or other combustible and toxic gas sensors as well as any other parameters for which 4-20ma analog signals and on/off dry contact switches are connected. It shall be capable of transmitting and receiving data, analyzing and activating alarms and controlling plant equipment on/off (such as fans, doors, heaters, pumps, electrical power, and the like).

1.06 SUBMITTALS

- A. Shop Drawings and Documentation: SUPPLIER shall provide three copies of manuals, specifications, wiring diagrams and component drawings of the equipment supplied. Ten copies of submittal drawings with supporting CAD files in DXF format and a Microsoft-Word file of the specification shall be provided on a compact disk.
- B. Product Data: Submit data for each system component and software module.
- C. Manufacturer's Installation Instructions: Submit.

- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of control components, including control units, and sensors.
 - 1. Revise shop drawings to reflect actual installation and operating sequences.
 - 2. Include data specified in "Submittals" in final "Record Documents" form.
- F. Operation and Maintenance Data: Submit interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
 - 1. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
 - 2. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.07 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.

1.08 WARRANTY

- A. Equipment Warranty and Software License -- Products shall be warranted for one year from date of shipment, except for delicate or expendable items such as batteries, lamp bulbs and sensing elements that can be easily damaged from abuse or negligence. Any product failing to perform as specified due to original factory defect(s) shall -- when returned to the factory with shipping prepaid and with written explanation of the problem and purchase date details -- be repaired or replaced and returned to OWNER at no charge. A service charge and return shipping costs may be assessed if non-warranty work is performed, or if no warranted fault is found. On-site trouble shooting, repair and replacement, and training shall be provided by SUPPLIER or its agents at no extra cost.

PART 2 - PRODUCTS

2.01 DIRECT DIGITAL CONTROLS

- A. Manufacturers:
 - 1. Rel-Tek
 - 2. Honeywell.
 - 3. Milram Technologies.

2.02 SENSORS

- A. Sensors -- All sensor parts shall be non-corrosive in humid environments. Sensors shall operate from a terminal excitation of 11-30VDC. Analog output shall be a generic 4-20ma linear signal. Convenient zero and span adjustments shall be

provided, not requiring special magnetic or optical keying devices. Unless otherwise specified, sensors shall be linear and accurate to +/- 5% of the FS range over an ambient temperature of 0-110F, 5-95% RH, given proper maintenance. Power-up shall not cause overshoot or alarms. Unless otherwise specified, all electronic circuitry shall be sealed in epoxy for protection from dirt/moisture, shock/vibration and rough handling. All sensor components shall be modular, fitted with connectors for easy replacement. Sensors shall be tested for 24 hours by SUPPLIER at the factory and re-calibrated on installation and commissioning. After commissioning, sensors shall be operated and serviced by OWNER in accordance with SUPPLIER's manuals to assure continuing accuracy and reliability. OWNER shall recalibrate sensors after any alarm event, as well as immediately following major changes in environmental conditions, readjustment of ranges, component replacement, relocation, or the like. Sensor operation shall not be adversely effected by CB or cell phone RF emissions when such transmitter and antenna are as close as 2-ft (900mm) of any sensor or its wiring. If intended for installation in hazardous areas, sensors shall be approved to UL standard, NFPA-70, Class I, Div 1 and 2, Group D. For enhanced durability and security, all sensors shall be approved and/or classified by the US Department of Labor, Mine Safety and Health Administration (MSHA) for use in hazardous areas of underground coal mines. For hazardous area deployment, matching dual-channel I.S. barriers shall be supplied by the sensor manufacturer to assure 100% compatibility. CNG sensors -- Combustible gas (methane, CNG) sensors shall employ a catalytic pellister bridge, diffusion access technology to linearly monitor ambient methane, propane and/or other combustible gases (as calibrated) over the range of 0-100% of the lower explosive limit (LEL). Bridge excitation shall be through an integral DC/DC converter to avoid effects of power supply transients and thereby maximizing pellister life expectancy. Sensing heads shall be resistant to engine exhaust and silicone poisoning, and shall not be injured if the gas concentration periodically reaches 50% LEL. Sensor requires oxygen to function properly. Sensors shall have triple gas filtering to minimize effects of dust and moisture. An external dust filter cap shall be removable for cleaning. Electrical hookup shall be with three conductors. Current drain shall not exceed 95mA at any time, including full scale operation. Sensor housing is 5x5x5" aluminum construction, externally color coded blue. Combustible gas sensors shall have a demonstrated mean time between failure (MTBF) of at least 20 years at 80% confidence level. Supporting data and calculations shall be supplied with submittals. Operating temperature range is -40F to +140F (-40C to 60C). Or approved equal.

- B. Alarms -- Each alarm unit shall have separately activated visual and audible functions. A 500,000 cp, 1-Hz strobe will activate at a low level (i.e. minor) alarm condition. A distinctively intermittent 105+ dBA (2-ft) sonic signal. will be activated on a high level (i.e. major) alarm condition. If required, both visual and audible functions can be set to activate simultaneously. Alarm units shall be of two types: a) with industrial NEMA-12 type enclosure for outdoor and garage usage, and b) configured as a compact, designer device for office use, and having a subdued horn and strobe intensity. Or approved equal.
- C. Integrated I/O, alarm, relay and power box for hazardous and non-hazardous sensors. Up to sixteen I.S. barriers shall be included in the box for interfacing with up to sixteen hazardous area sensors, as well as remote calibration utility cards for manually adjusting sensor signals and for regulating individual barrier currents. Current regulators shall be adjustable for 55, 85, 95 and 130ma. The 24x24x8" NEMA-12 steel, wall-mountable enclosure may also house an AC/DC power supply and backup battery; an emergency stop and an alarm reset switch; and an alarm strobe and horn; as well as the essential telemetry to minimize field wiring and simplify installation. All

internal connections shall be factory wired, thus avoiding costly field wiring. Replacement of components shall be by modular, plug-in exchange. Operating power is from 110-120VAC or 24-28VDC.

- D. Calibration Kit -- A portable calibration kit for periodically calibrating the gas sensors shall be supplied. The kit shall contain two 15-liter (STP) disposable tanks of cal-gas (one zero and one span) which shall be clearly marked as to the sensor type (methane, propane, CO, etc.) and the gas concentration. Span calibration gas mixture shall be of a composite mixture, so as to service all above sensor types from a single span tank. To avoid variances among calibration personnel and gas pressure, a quantitative flowmeter and appropriate metering valves shall be included. Gas concentrations shall be accurate within 2% of the stated mix component values, and shall be supported with test analysis documentation traceable to the National Bureau of Standards. Methane gas is deemed equal to natural gas of the same specified concentration. Pressure gauges shall continuously display the pressure in both gas supply tanks. Tanks shall comply with DOT-39 and be so labeled. A 10-ft long gas delivery tube and sensor adapter shall be included.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Commissioning -- Installation of the system shall be made by contractor to SUPPLIER'S documentation. Upon completion of installation, SUPPLIER'S field service representative shall perform on-site inspection, turn power onto system, test and demonstrate operation, and provide training for OWNER personnel. Site visit(s) shall be coordinated by OWNER, providing at least two weeks advance notice for SUPPLIER to schedule personnel and arrange transportation.

3.02 COMPATIBILITY

- A. Compatibility, Interchangeability and Spares -- Sensors, alarms supplied shall be standard production items that are normally available from factory stock. SUPPLIER shall provide ENGINEER with a list of spare parts for supporting the GMS. Contractor shall purchase and maintain these spares, to be stored on-site for quick replacement. For five years following commissioning, SUPPLIER shall provide, on average, two work-day repair turn-around time at its factory, covering any item returned by OWNER to the factory for service designated as urgent and shipped to the factory by overnight delivery service. SUPPLIER will return ship the unit to OWNER via the same priority shipment as it was received.

END OF SECTION 15910

SECTION 15950

TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Testing, adjusting, and balancing of mechanical and plumbing systems.
- B. The General Contractor will select a qualified, independent technical balancing firm and/or laboratory to provide balancing, testing and adjusting services. These services will be paid for by the General Contractor.
- C. Perform the balancing, testing and adjusting services with Associated Air Balance Council (AABC) certified personnel or employ a qualified, independent, technical balancing firm and/or laboratory.
- D. Each section of Division 15 - Mechanical that has products or systems listed herein incorporate this section by reference and is incomplete without the required tests stated herein.
- E. Control system for the Enthalpy Wheel unit is required to have a manufacturer's furnished automated controls commissioning tester at the time of start up paid for by the mechanical contractor when purchasing the unit. The commissioning of the Enthalpy Wheel unit is not part of this section. Refer to section 15900 for commissioning of the Enthalpy Wheel unit. The air balance of the supply, return, and exhaust ductwork connected to the Enthalpy Wheel unit is part of this section and shall incorporate the requirements of this section to perform the air balance.

1.03 REFERENCES

- A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. ASHRAE - 1984 Systems Handbook: Chapter 37, Testing, Adjusting and Balancing.
- C. NFPA 12A - Halon 1301 Fire Extinguishing Systems.

1.04 SUBMITTALS

- A. Test Reports:
 - 1. Submit test report forms for review minimum 90 days prior to requesting final review by A/E.
 - 2. Furnish six individually bound copies of test data. Neatly type and arrange data. Include with the data the date tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken, both prior to

- and after any corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation.
3. A/E will retain one copy. Remaining copies will be returned for inclusion in operation and maintenance manuals.
 4. Prior to commencing work, submit draft reports indicating adjusting, balancing and equipment data required.
 5. Submit draft copies of report for review prior to final acceptance of project. Provide final copies for A/E and for inclusion in operating and maintenance manuals.
- B. Include a set of reduced drawings with air outlets and equipment identified to correspond with data sheets and indicating thermostat locations.

1.05 AIR SYSTEM BALANCING

A. Quality Assurance:

1. Company specializing in the testing, adjusting and balancing of systems specified with a minimum of three years of documented experience and a member in good standing, certified to perform services, of the AABC. Perform work under supervision of AABC Certified Test and Balance Engineer.
2. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.

B. General:

1. Conform to the specifications which include, but are not limited to, the following:
 - a. Air and water flows balanced to specified quantities.
 - b. Temperature regulation verification by hourly readings for three consecutive eight-hour days.
 - c. Three inspections within 90 days of occupancy for temperature verification.
 - d. Opposite season adjustment of systems.
2. Provide sufficient funds in project cost estimate and bid proposal to cover all work required for the testing, balancing and adjusting of air distribution as determined by the balancing firm.
3. Complete the installation and operate all systems to ensure they are operating in accordance with the requirements of these specifications and drawings, and perform all other items as described hereinafter to assist the balancing firm in performing the balancing, testing and adjusting of the systems. The items include, but are not be limited to, the following:
 - a. Air Distribution Systems:
 - 1) Verify installation of all supply, return and exhaust ducts for conformity to design.
 - 2) Verify all volume, splitter, extractor and fire dampers are properly located and functional. Provide tight damper closure and full opening, smooth and free operation.
 - 3) Air supply, return, exhaust, transfer grilles, registers, diffusers and terminal units installed and operational.

- 4) Blank and/or seal air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., to eliminate excessive bypass or leakage of air.
 - 5) All fans (supply, return, relief and exhaust) operating and verified for freedom from vibration, proper fan rotation and belt tension; correct overload heater elements; and clean filters installed.
- b. Automatic Controls except for Enthalpy Wheel unit:
 - 1) Verify that all control components are installed in accordance with project requirements, including all electrical interlocks, damper sequence air and water resets, fire stats. Stroke all controls through the full range.
 - 2) Calibrate all controlling instruments and set for the design conditions.
 - c. Cooperate with the balancing firm to provide all necessary data on the design and proper application of the system components and furnish all labor and material required to eliminate any deficiencies. List all motors, nameplate data and size of overload heater installed. Record motor amperage during operation.
 - d. The drawings and specifications indicate valves, dampers, sheaves, and miscellaneous adjustment devices required to obtain optimum operating conditions to verify that all adjustment devices are accessible and readily adjustable.
 - e. Accurately record actual locations of balancing valves and rough setting.
- C. Sequencing and Scheduling:
1. Sequence work to commence after completion of systems and prior to substantial completion of project.
- D. Submit reports on AABC National Standards for Total System Balance forms and include the following information:
1. Title Page:
 - a. Company name.
 - b. Company address.
 - c. Company telephone number.
 - d. Project name.
 - e. Project location.
 - f. Project A/E.
 - g. Project Contractor.
 - h. Project altitude.
 2. Air Moving Equipment:
 - a. Location.
 - b. Manufacturer.
 - c. Model.
 - d. Air flow, specified and actual.
 - e. Return air flow, specified and actual.
 - f. Outside air flow, specified and actual.
 - g. Total static pressure (total external), specified and actual.
 - h. Inlet pressure.

- i. Discharge pressure.
 - j. Fan rotations per minute.
3. Exhaust Fan Data:
- a. Location.
 - b. Manufacturer.
 - c. Model.
 - d. Air flow, specified and actual.
 - e. Total static pressure (total external), specified and actual.
 - f. Inlet pressure.
 - g. Discharge pressure.
 - h. Fan rotations per minute.
4. Return Air/Outside Air Data:
- a. Identification/location.
 - b. Design air flow.
 - c. Actual air flow.
 - d. Design return air flow.
 - e. Actual return air flow.
 - f. Design outside air flow.
 - g. Actual outside air flow.
 - h. Return air temperature.
 - i. Outside air temperature.
 - j. Required mixed air temperature.
 - k. Actual mixed air temperature.
 - l. Design outside/return air ratio.
 - m. Actual outside/return air ratio.
5. Electric Motors:
- a. Manufacturer.
 - b. HP/BHP.
 - c. Phase, voltage, amperage; nameplate, actual, no load.
 - d. Rotations per minute.
 - e. Service factor.
 - f. Starter size, rating, heater elements.
 - g. Exercise starters through its entire operating sequence.
6. V-Belt Drive:
- a. Identification/location.
 - b. Required driven rotations per minute.
 - c. Driven sheave, diameter and rotations per minute.
 - d. Belt, size and quantity.
 - e. Motor sheave, diameter and rotations per minute.
 - f. Center-to-center distance, maximum, minimum and actual.
7. Duct Traverse:
- a. System zone/branch.
 - b. Duct size.
 - c. Area.

- d. Design velocity.
- e. Design air flow.
- f. Test velocity.
- g. Test air flow.
- h. Duct static pressure.
- i. Air temperature.
- j. Air correction factor.

8. Air Distribution Test Sheet:

- a. Air terminal number.
- b. Room number/location.
- c. Terminal type.
- d. Terminal size.
- e. Area factor.
- f. Design velocity.
- g. Design air flow.
- h. Test (final) velocity.
- i. Test (final) air flow.
- j. Percent of design air flow.

9. Pump Data:

- a. Identification/number.
- b. Manufacturer.
- c. Size/model.
- d. Impeller.
- e. Service.
- f. Design flow rate, pressure drop, BHP.
- g. Actual flow rate, pressure drop, BHP.
- h. Discharge pressure.
- i. Suction pressure.
- j. Total operating head pressure.
- k. Shut off, discharge and suction pressure.
- l. Shut off, total head pressure.

10. DX Cooling Coil Data:

- a. Identification/number.
- b. Location.
- c. Service.
- d. Manufacturer.
- e. Air flow, design and actual.
- f. Entering air DB temperature, design and actual.
- g. Entering air WB temperature, design and actual.
- h. Leaving air DB temperature, design and actual.
- i. Leaving air WB temperature, design and actual.
- j. Air pressure drop, design and actual.

11. Heating Data:

- a. Identification/number.
- b. Location.
- c. Service.

- d. Manufacturer.
- e. Air flow, design and actual.
- f. Entering air temperature, design and actual.
- g. Leaving air temperature, design and actual.
- h. Air pressure drop, design and actual.

12. Sound Level Report:

- a. Location.
- b. Octave bands - equipment off.
- c. Octave bands - equipment on.

13. Vibration Tests:

a. Location of Points:

- 1) Fan bearing, drive end.
- 2) Fan bearing, opposite end.
- 3) Motor bearing, center (if applicable).
- 4) Motor bearing, drive end.
- 5) Motor bearing, opposite end.
- 6) Casing (bottom or top).
- 7) Casing (side).
- 8) Duct after flexible connection (discharge).
- 9) Duct after flexible connection (suction).

b. Test Readings:

- 1) Horizontal, velocity and displacement.
- 2) Vertical, velocity and displacement.
- 3) Axial, velocity and displacement.

- c. Normally acceptable readings, velocity and acceleration.
- d. Unusual conditions at time of test.
- e. Vibration source (if non-complying).

14. Duct Leak Test:

- a. Description of ductwork under test.
- b. Duct design operating pressure.
- c. Duct design test static pressure.
- d. Duct capacity, air flow.
- e. Maximum allowable leakage duct capacity times leak factor.
- f. Test Apparatus:
 - 1) Blower.
 - 2) Orifice, tube size.
 - 3) Orifice size.
 - 4) Calibrated.
- g. Test static pressure.
- h. Test orifice differential pressure.
- i. Leakage.

15. Steam Pressure Wash Combustion Test: In accordance with ASTM PTC 4.1. Include the following:
- a. Manufacturer.
 - b. Model.
 - c. Firing rate.
 - d. Overfire draft.
 - e. Gas meter timing dial size.
 - f. Gas meter time per revolution.
 - g. Gas pressure at meter outlet.
 - h. Gas flow rate.
 - i. Heat input.
 - j. Burner manifold gas pressure.
 - k. Percent carbon monoxide (CO).
 - l. Percent carbon dioxide (CO₂).
 - m. Percent oxygen (O₂).
 - n. Percent excess air.
 - o. Flue gas temperature at outlet.
 - p. Ambient temperature.
 - q. Net stack temperature.
 - r. Percent stack loss.
 - s. Percent combustion efficiency.
 - t. Heat output.

1.06 PLUMBING SYSTEM

- A. Submit plumbing system to operational tests to demonstrate satisfactory operation. Include the following information:
1. Title Page:
 - a. Company name.
 - b. Company address.
 - c. Company telephone number.
 - d. Project name.
 - e. Project location.
 - f. Project A/E.
 - g. Project Contractor.
 2. Time date and duration of test for each system.
 3. Water pressures at the most remote and highest fixtures.
 4. Operation of each fixture and fixture trim.
 5. Operation of each valve, hydrant and faucet.
 6. Pump suction and discharge pressures.
 7. Temperature of each domestic hot water supply.
 8. Operation of each floor drain by flooding with water.
 9. Operation of each vacuum breaker and backflow preventer.
 10. Piping systems: Test results of all pressure tests.
 11. Pumps: Field check alignment of all couplings and pump vibration.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish proposed test procedures, recording forms, list of personnel and test equipment for A/E review.
- B. Follow recommended procedures for testing as published by test equipment manufacturer.
- C. Provide instruments required for testing, adjusting and balancing operations. Make instruments available to A/E to facilitate spot checks during testing.
- D. Provide any additional balancing devices required for complete system balancing.

3.02 AIR SYSTEM BALANCING

- A. Before commencing work, verify that systems are complete and operable. Ensure the following:
 - 1. Equipment is operable and in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Correct fan rotation.
 - 7. Fire and volume dampers are in place and open.
 - 8. Coil fins have been cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and operable.
 - 11. Duct system leakage has been minimized.
 - 12. Proper strainer baskets are clean and in place.
 - 13. Service and balance valves are open.
 - 14. Report any defects or deficiencies noted during performance of services to A/E.
 - 15. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.
 - 16. Beginning of work means acceptance of existing conditions.
- B. Installation Tolerances:
 - 1. Adjust air handling systems except for Enthalpy Wheel unit to scheduled values plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems.
 - 2. Adjust hydronic systems to plus or minus 10 percent of design conditions indicated.
- C. Test Procedures:
 - 1. Adjust air handling and distribution systems to provide design supply, return, and exhaust air quantities.
 - 2. Make air quantity measurements in ducts by pitot tube traverse of entire cross sectional area of duct.
 - 3. Measure air quantities at air inlets and outlets.

4. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
5. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Control volume by internal duct devices such as dampers and splitters.
6. Vary total system air quantities by adjustment of sheaves. Provide drive changes required. Vary branch air quantities by damper regulation.
7. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
8. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
9. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
10. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
11. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
12. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
13. Test run fan/motor combinations, volume dampers and controls. Check sequence of operation and air flow limits at factory prior to shipment and submit test reports.
14. Base performance on tests conducted in accordance with ADC 1062.
15. Check that automatic flow controller is capable of maintaining air flow to within 5 percent of set point with inlet static pressure variations up to 2 inches.
16. Maximum Casing Leakage: 2 percent of design air flow at rated inlet static pressure.
17. Maximum Damper Leakage: 2 percent of design air flow at inlet static pressure.
18. Set volume with damper operator attached to assembly allowing modulation from 100 percent of design flow to 20 percent design flow. Set units with heating coils for minimum 35 percent design flow.
19. Provide record data that represents actually measured, or observed condition.
20. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
21. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
22. Leave systems in proper working order, replace adjustable sheaves with permanent fixed position sheaves, replace belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
23. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by A/E.
24. Check and adjust systems for opposite season performance approximately six months after final acceptance and submit report.

3.03 MECHANICAL EQUIPMENT

A. Air-Cooled Condensing Units:

1. Provide initial charge of refrigerant and oil for each refrigeration system; replace losses of oil or refrigerant prior to end of guarantee period, and supply to Owner one complete charge of lubricating oil in addition to that placed in the system.
2. Charge the system with refrigerant that test the entire system for leaks after completion of installation. Repair any leaks and put the system into operation. Test the system after repair of leaks to prove performance.
3. If initial start-up and testing takes place in winter and machines are to remain inoperative, shut the system down and start-up and repeat testing at the beginning of the first cooling season.
4. Provide cooling season start-up and winter season shutdown for first year of operation.

B. Refrigeration System:

1. Clean lines of scale, dirt and foreign matter before making connections and purge with dry nitrogen to prevent oxidation during brazing.
2. After completion, pressure the high and low pressure sides of the piping system at the test pressures specified in ASHRAE 15 for the refrigerant type to be used. Leak test with a bubble solution followed by a Halide torch test. Repair any leaks and repeat tests until no further leaks are found and the system passes a static leak test pressure for a duration of 24 hours.
3. After the pressure tests are completed, exhaust the system including the coils by a suitable vacuum pump connected to the liquid line. After 2.5 mm of mercury absolute pressure is obtained, continue the evacuation for 72 hours. Check the vacuum by a suitable mercury column gage.
4. After the dehydration of the system is thus completed, charge the system with refrigerant and put into operation.
5. Follow the general test guidelines of ASHRAE 15 for the tests of the refrigerant piping system.
6. Test refrigeration system in accordance with ASME B31.5.
7. Provide written test report detailing methods, materials, and results.
8. Additional Tests: When deficiencies, defects or malfunctions develop during the tests required, suspend all further testing of the system until proper adjustments, corrections or revisions have been made to assure proper performance of the system. If these revisions require more than a nominal delay, notify A/E when the additional work has been completed, to arrange a new inspection and test of the system. Repeat all required tests prior to final acceptance, unless directed otherwise.
9. Manufacturer's Representative: Provide the services of representatives or technicians from the manufacturers of the Enthalpy Wheel unit control system experienced in the installation and operation of the type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of the system and to provide instruction to facility personnel.

3.04 PLUMBING EQUIPMENT

A. Natural Gas:

1. Apply pressure equal to 1-1/2 times the operating pressure with 50 pounds per square inch-gage as a minimum. Utilize oil free dry air or gaseous nitrogen and hold pressure for one hour with no drop in pressure. Repair all leaks.
2. Record natural gas reading at entrance to building on main line with valves to equipment shutoff. Read each indicating instrument at 1/2 hour intervals for a period of four hours and a final reading at the end of 24 hours.

B. Sanitary Waste, Vent and Storm Drainage Systems: Test systems throughout upon completion of the rough work and without fixtures connected. Test underground lines with not less than 15 feet hydrostatic head and prove leak free for one hour. After storm drainage piping is complete, plug all openings, except tops of stacks, and fill system with water and prove leak free for one hour. Plug and test sanitary system by floors and prove leak free for one hour. Flush floor drains for proper operation.

C. Domestic Water System:

1. Test all hot and cold water piping prior to being insulated. Test in place with 125 pounds per square inch hydrostatic test at the low points and maintain pressure without pumping for one hour.
2. Completely flush water circulating system with water with strainers removed. Fill system with water with strainer installed and circulate water for 48 hours minimum with a 1 inch open bleed valve or until bleed water is clear. After completing this operation, chemically treat system, clean strainer and open to central system.
3. Thoroughly flush all domestic water piping and tanks and then treat and sterilize with HTH or a liquid chlorine gas and water solution, or a direct chlorine gas placed in the upstream side in amounts to give a dosage of 50 ppm chlorine calculated on the volume of water the piping will contain. A minimum residual of 5 ppm chlorine shall remain in all parts of the system for a minimum of 24 hours. After sterilizing, flush all lines thoroughly. The foregoing shall be considered minimum requirements. The sterilization shall be in accordance with local utility company requirements.
4. Under no circumstances shall the Contractor permit the use of any portion of the domestic water system until it has been properly sterilized and certified same by the local water department.
5. Test results of disinfection of water piping system.

END OF SECTION 15950

SECTION 16050

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Each section included in Division 16 is incomplete without the provisions stated herein.
- B. This section includes a description of the scope of work for the alternates listed in Section 01100.

1.03 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Access doors.

1.04 RELATED SECTIONS

- A. Section 02324 - Trenching.
- B. Section 08311 - Access Doors and Frames.
- C. Section 09910 - Paints.
- D. Section 16080 - Electrical Testing.

1.05 SYSTEM DESCRIPTION

- A. Provide a complete operational electrical system. Route conduit and install equipment to avoid conflicts with other trades and to enhance maintainability of system.

1.06 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft.).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. IEEE C2 - National Electrical Safety Code.
- D. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code 1999 with California Amendments)
- E. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.07 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word is understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.
- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions which directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with raceways, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.
- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.08 SUBMITTALS

- A. Access Doors: Indicate detailed dimension.

1.09 REGULATORY REQUIREMENTS

- A. Perform work in accordance with NFPA 70 and the editions, revisions, amendments, or supplements of applicable statutes, ordinances, codes, or regulations of Federal, State, and Local Authorities having jurisdiction in effect on the date bids are received.
- B. Where approval standards have been established by OSHA, UL, ASME, AGA, AMCA, ANSI, ARI, NFPA, State Fire Insurance Regulatory Body, and IRI, FM, follow these standards whether or not indicated on the Drawings and Specifications. Include cost of work required to comply with requirements of these authorities in the original proposal. Comply with IEEE C2 where applicable.
- C. Requirements in reference specifications and standards are minimum for equipment, material, and work. In instances where capacities, size, or other features of equipment, devices, or materials exceed these minimums, meet specified or scheduled capacities.
- D. Resolve code interpretations discovered in Contract Documents with A/E prior to Contract award. After Contract award, make corrections or additions necessary for compliance with applicable codes.
- E. Arrange with local and state authorities and utility companies for permits, fees, and service connections, verifying locations and arrangement, and pay charges including inspections.

1.10 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between conduit, equipment, architectural, and structural work.
- B. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.

- C. Drawings are based on equipment specified. Make adjustments, modifications, or changes required, due to use of other equipment.

1.11 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing work.

- B. Space Requirements:

1. Consider space limitations imposed by contiguous work in selection and location of equipment and material. Do not provide equipment or material which is not suitable in this respect.
2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by A/E.
3. Conceal conduit in finished areas. Conduit may be exposed in mechanical rooms, electrical rooms and where specifically allowed on Drawings. Route conduit through the building without interfering with other contractors' equipment or construction.
4. Provide maximum possible clear height underneath conduit. Install conduit as high as possible.
5. Install equipment requiring service so that it is easily accessible.
6. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
7. Timely place equipment too large to fit through finished openings, and stairways.

- C. Site Obstructions:

1. Drawings indicate certain information pertaining to surface and subsurface obstructions which has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
4. Assume total responsibility for and repair damage to existing utilities or construction, whether or not such existing facilities are shown. Repair the lines, if damaged.

- D. Cutting and Patching:

1. Submit written request to A/E in advance of cutting or alterations.
2. Execute cutting and demolition by methods which will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
3. Restore work which has been cut or removed; install new products complying

- with specified products, functions, tolerances and finishes as specified.
4. Escutcheon Plates:
 - a. Heavy chrome-plated or nickel-plated escutcheon plates for penetrations of finished surface.
 - b. Product: B&C No. 10 with concealed hinges.
 5. Fit work airtight to conduit, sleeves, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.12 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment of a domestic manufacturer by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed and in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request to A/E for supplementary instructions in cases of doubt as to Work intended or in event of need for explanation thereof.
- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

1.13 DELIVERY, STORAGE AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Equipment shall not be delivered to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Store equipment in a clean, dry place, protected from other construction.
- C. While stored, maintain factory wrappings or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft. Provide heat where required to prevent condensation.
- D. Adequately brace and package equipment to prevent breakage and distortion while in transit.
- E. Handle in accordance with manufacturer's written instructions. Be careful to prevent

internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to manufacturer.

1.14 COORDINATION

- A. Coordinate layout and installation with mechanical and other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.15 EXCAVATION

- A. Trenching and backfilling shall comply with Section 02324 - Trenching as well as provisions specified herein.

- B. Trenching:

1. Provide minimum 12 inches between outer surfaces and embankment or shoring which may be used, when excavating for manholes, pull boxes, and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
2. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
3. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 3-Foot Minimum Cover: Raceways for primary voltage conductors.
 - b. 2-Foot Minimum Cover: Raceways for secondary conductors.

- C. Backfilling:

1. Backfill trenches after conduit, fittings, and joints have been tested and approved.
2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill with remainder of trenches with satisfactory materials. Backfill shall be material specified as "Fill" in Section 02055 - Soils or on-site soil conforming to the referenced geotechnical investigation. Place and compact fill as specified in Section 02324 - Trenching. Take care not to damage utility lines.
3. Where trenches cross streets, driveways, building slabs, or other pavements, backfill trench utility line with sand backfill material in 6 inch layers. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

1.16 PAINTING

- A. Comply with Section 09910 for painting.

- B. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- C. Repair damage to factory painted finishes.
- D. Remove splattered and incidental paint from electrical equipment.

1.17 ACCESS DOORS

- A. Provide hinged access doors in walls, floors and ceilings to permit access to equipment requiring service or adjustment.
- B. Provide hinged access doors and frames as follows:
 - 1. Drywall Construction:
 - a. Provide with concealed spring hinges and flush screwdriver operated cam locks in sufficient number of the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, Style DW.
 - 2. Visible Masonry and Ceramic Tile: Milcor, Style M.
 - 3. Gypsum and Cement Plaster: Milcor, Style K.
 - 4. Acoustic Plaster:
 - a. Reinforce panel as required to prevent sagging. Provide continuous steel piano type hinge for the length of the panel, and sleeved and grommeted screwdriver operated cam locks in sufficient number for the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, Style AP.
 - 5. Acoustic Tile: Milcor, Style AT.
- C. Provide continuous concealed hinges and cam locks.
- D. Provide UL listed 1-1/2 hour Label "B" access doors with automatic self-closing latching mechanism where required.
- E. Provide removable ceiling access tile section immediately adjacent to each mechanical or electrical device located in the ceiling plenum above removable tile ceiling.
- F. Coordinate approval and location of doors with A/E.

1.18 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, ballasts, or other parts of the work, rectify such condition at no additional compensation.

1.19 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete electrical system. Notify A/E seven days prior to beginning equipment start-up.
- B. Certify in writing that these services have been performed.
- C. Perform tests as specified in Section 16080.

1.20 SERVICE

- A. Inspect, clean, and service light fixtures; replace incandescent lamps; and replace fluorescent or HID lamps if utilized for construction lighting immediately prior to final acceptance of project.
- B. Clean and polish fixtures, equipment, and materials thoroughly, and return to "as new" condition.
- C. Remove excess material and debris. Place electrical systems in complete working order before request for final review. Broom clean areas.

1.21 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed conduit and equipment.
- B. Obtain mylar Drawings from A/E, at Contractor's expense, and record as-built conditions.
- C. Clearly and accurately delineate the work by dimensions on the mylar record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.
- D. Final mylar record drawings shall be marked "AS-BUILT," and signed and dated by Contractor.
- E. Provide certified "AS-BUILT" drawings at the conclusion of project.

1.22 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.23 GUARANTEE

- A. Guarantee materials, parts and labor for Work for one year from the date of issuance of

occupancy permit. During that period make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION (Not used.)

END OF SECTION 16050

SECTION 16051

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Preparation and submission of shop drawings and product data.

1.03 RELATED SECTIONS

- A. Section 01330 - Submittal Procedures
- B. Section 16052 - Operation and Maintenance Manuals.

1.04 MANUFACTURERS

- A. Listed manufacturers will be acceptable as long as specified requirements are met.
- B. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to A/E that their products comply with the specifications. Furthermore, those manufacturers shall agree in writing to bear the cost of A/E time to review compliance with the specifications whether their products are approved or not.
- C. Provide power distribution and control equipment of the same manufacturer (i.e., switchboards, panelboards, transformers, motor control centers).
- D. Provide similar equipment of same manufacturer (i.e., wiring devices).

1.05 CONTRACTOR'S CERTIFICATION

- A. Submittals will be submitted only by the Contractor. Contractor shall review as indicated in Section 01330. Indicate by signed stamp that the contract documents have been checked, that the work shown in the submittals is in accordance with contract requirements and that dimensions and relationship with work of other trades have been checked. If submittals are submitted for review that have not been checked and signed by the Contractor, they will be returned for checking before being considered by A/E.

1.06 PREPARATION

- A. Include information relevant to particular equipment or materials to be furnished, where product data published by manufacturer is part of submittal.
- B. Provide documentation of compliance with manufacturer's published literature or drawings or letter signed by officer of manufacturer in cases where compliance with UL, FM, ARI, IRI, or other similar organization standards are required.

- C. Furnish submittals to the Submittals Schedule indicated in Section 01330.
- D. Include identifying symbols and equipment numbers used in the contract documents for all equipment and material submitted.
- E. Cross reference sheet numbers on Drawings for shop drawings. Provide shop drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment and clearances for maintenance and code requirements.
- F. Submit only the requested submittals complete by types of equipment (i.e., lighting fixtures, power distribution, etc.) labeled with applicable specification section(s) included. Each submittal will be handled separately. Should any item not be acceptable, the entire submittal will be returned to the Contractor for correction and resubmittal. Partial submittals are unacceptable. The intent of this requirement is that all approved bound sets of data will be identical and will contain only acceptable information.
- G. Submit a compliance sheet for each submittal indicating the submittal is in full compliance with the drawings and specifications. Indicate by drawing number or specification section number and paragraph numbers all exceptions taken and include an explanation.
- H. The review of submittals does not relieve or modify the Contractor's responsibility for compliance with the Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that, in the review process, noting of some discrepancies but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the submittals, the Contract Documents govern the work, and are neither waived nor suspended in any way by the review of the submittals.
- I. Include in submittals sufficient plans, elevations, sections, performance data, dimensions, bolt locations, ratings, sound data, weights and schematics to clearly describe the equipment and to show compliance with these specifications. Provide Transmittal Form as identified in Section 01330. Additionally provide a cover or title sheet for the submittal containing the following:
 - 1. Name of Contractor originating the submittal.
 - 2. Name of project for which the submittal is made.
 - 3. An index of all items submitted including:
 - a. Mark of equipment on drawings.
 - b. Manufacturer.
 - c. Catalog number.
 - d. Specification section number.
 - 4. Date of submittal and date of each revision.
 - 5. Contractor's certification of review.
 - 6. Contractor's certification of compliance.
- J. Shop drawings and product data which do not comply with the requirements herein will be returned for resubmittal. Submit two paper sepias for shop drawings.
- K. A/E will retain one copy and Owner will retain one copy of submittal. Remaining

copies will be returned to Contractor marked FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat submittal in accordance with this section. Submit complete and accurate shop drawings and product data at first submittal. If submittals are returned to Contractor marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one additional submission will be permitted.

- L. If the reproducible sepia or product data marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED is altered for any reason after it has been stamped, the REVIEWED stamp shall automatically be voided.
- M. Provide all work in accordance with the submittals stamped FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the submittals and the Contract Documents, the Contract Documents shall govern the work.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION

3.01 REQUIRED SUBMITTALS

- A. Furnish product data for devices, equipment, or systems as specified. Other submittals will be returned to Contractor without review. Furnish shop drawings as indicated.

3.02 FINAL SUBMITTAL

- A. In addition to the number of copies of shop drawings and product data required to review submittals, maintain separate file of final reviewed copies of such material. Deliver approved submittals in a hard-back binder for the Owner's use. Incorporate changes and revisions made throughout the construction period. Refer to Section 16052.

END OF SECTION 16051

SECTION 16052

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Preparation and submission of operation and maintenance manuals.
- B. Each section included in Division 16 - Electrical incorporates this section by reference and is incomplete without the provisions stated herein.
- C. Requirements of this section are in addition to the requirements of Section 01770 - Closeout Procedures.

1.03 RELATED SECTIONS

- A. Section 01770 - Closeout Procedures
- B. Section 16050 - Electrical General Provisions.
- C. Section 16051 - Submittals.
- D. Section 16080 - Electrical Testing.

1.04 PREPARATION

- A. Furnish four copies of complete operation and maintenance instructions, service manuals and parts list applicable to each manufactured item of equipment furnished. Bind operation and maintenance information in four separate looseleaf binders and deliver to A/E at least four weeks prior to final review of the project.
- B. Organize binders to contain like equipment in separate divisions. Provide a complete double index for each binder to include:
 - 1. An alphabetized list of the products by name.
 - 2. An alphabetized list of manufacturers whose products have been incorporated in the work together with their addresses and the name, addresses and telephone numbers of the local sales representative or supplier.
- C. For each section of product, equipment or system, organize the data as follows:
 - 1. Furnish a general description of the equipment or system listing the major components, intended service and other general data.
 - 2. Furnish technical data including nameplate data, design parameters, ratings, capacity, performance data, operating curves, characteristics, and the like. Clearly distinguish between information which does and does not apply.
 - 3. List warnings and cautions to be observed during both installation and operations.

4. Fully detailed installation and operation instructions including special tools required, alignment instructions, start-up, and shut-down sequences.
5. Furnish maintenance, service and repair instructions including maintenance and service schedules, materials, and methods for performing routine and annual service.
6. Furnish a troubleshooting guide and check list indicating common failures, test methods and procedures for determining component fault or failure.
7. Furnish a spare parts list indicating part and order number with name, address, and telephone number of supplier. Include current prices of replacement parts and supplies.
8. Furnish diagrams including controls, wiring, installation or operation of the equipment or system.
9. Furnish copies of all approved submittals. Refer to Section 16051.
10. Furnish copies of all test reports. Refer to Section 16080.
11. Print copies of the "AS-BUILT" drawings. Refer to Section 16050.
12. Furnish all warranties and guarantees.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION (Not used.)

PART 4 - MEASUREMENT AND PAYMENT

4.01 GENERAL

- A. The work of this Section will not be measured separately for payment but will be paid at the Contract lump sum price for Electrical Work.

END OF SECTION 16052

SECTION 16053

ELECTRICAL SYSTEM COORDINATION STUDY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Work included: Services necessary to complete the system analysis studies required for the item specified under this Division, including but not limited to:
 - 1. Short circuit study.
 - 2. Protective device evaluation study.
 - 3. Protective device coordination study.
 - 4. Arc flash hazard analysis

1.03 SUBMITTALS

- A. Submit six copies of protection coordination studies bound in 8-1/2 inch by 11-inch hard cover volumes with drawings and diagrams folded to fit the 8-1/2 inch by 11-inch format. Securely retain documents in pockets or compartments of rigid binder. Submittals, Re-submittals and Final submittals shall be provided as required by Section 16051.
- B. Include complete low voltage distribution system. Provide identification and description of industry testing standards on which study is based, for each section of study.
- C. The study shall be performed with the aid of a computer program and shall be in accordance with the latest applicable IEEE, ANSI and NFPA 70E standards.
- D. Provide calculations, conclusions, and recommendations as part of study general content.
- E. Provide all field investigation and coordinate with equipment vendors to obtain all data required for completion of the study. Coordinate with utility company and generator vendor to determine source characteristics.
- F. The study shall be submitted prior to final review of the distribution equipment shop drawings and prior to release of equipment for manufacture. If formal completion of the study may cause delay in equipment manufacture, approval may be obtained for a preliminary submittal of sufficient data to ensure that the selection of device ratings and characteristics will be satisfactory. Then the formal study will be provided to verify the preliminary findings.
- G. Provide each study with following:
 - 1. Description, purpose, basis and scope of the study and a single line diagram of that portion of the power system, which is included within the scope of the study.

2. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties and commentary regarding it.
3. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding it.
4. Coordination plots which graphically indicate coordination proposed for several systems. Provide plots centered on full scale log-log-forms.
5. Coordination plots with complete titles, representative one-line diagrams and legends, associated power company's system characteristics, significant motor starting characteristics, complete parameters for power, fuses, if applicable, and associated system load protective devices.
6. Coordination plots which define types of protective devices selected, with proposed coil taps, time dial settings, and pick-up settings required.
7. Long time region of coordination plots shall indicate complete tap scale for each relay and full load current transformer parameters and designate pick-ups required for low voltage circuit breakers.
8. Short time region shall indicate low voltage circuit breaker, short time and instantaneous trip devices, fuse manufacturing tolerance bands, when applicable, and significant symmetrical and asymmetrical fault currents.
9. Tabulated results of Arc flash analysis calculations to determine Arc Flash Boundary, working distance, Incident energy, and PPE requirements for each protective device in the system.

H. Coordinate each item of equipment as follows:

1. Separate low voltage power circuit breakers from each other by 16 percent current margin for coordination and protection in event of secondary line-to-line faults.
2. Terminate protective device characteristics or operating band to reflect actual symmetrical and asymmetrical fault currents sensed by device.
3. Prepare study with network analyzer, computer, or by written calculations. Include complete fault calculations as specified for each proposed and ultimate source combination.
4. Source combinations include proposed and future large motors or generators.

I. Provide manufacturer-prepared system studies of switchgear or equipment for incoming service to building.

J. An arc flash hazard analysis study shall be performed with the necessary calculations to provide equipment marking to meet the requirements of NEC 2002 edition Article 110.16. The studies shall be in accordance with NFPA 70E 2004 edition.

1. The study shall be for all normal power and generator backup modes of operation. The study shall include all medium and low voltage classes of equipment from the transformer serving the building and generator service protective devices down to and including the largest rated device in the low voltage panelboards.
2. Tabulate all the data used in the calculations to determine Arc Flash (AF) Boundary, Incident energy, and personal protective equipment (PPE) requirements for each protective device in the system. Working distance shall be assumed to be 18".

K. Drawings and specifications indicate general requirements for motors, motor starter equipment, and low voltage equipment. Determine additional specific characteristics of equipment furnished in accordance with results of short circuit and protective device coordination study.

1. Submit equipment design discrepancies and proposed corrective modifications, if required, with short circuit and protective device coordination study. Identify variations clearly on shop drawings.
2. Provide equipment, overcurrent devices, field settings, adjustments and minor modifications for conformance with approved short circuit and protective device coordination study.
3. Do not submit equipment shop drawings until short circuit and protective device coordination study has been approved.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION

3.01 FIELD MARKING OF FLASH PROTECTION

- A. The equipment manufacturer shall provide field marking of equipment indicating arc flash and shock hazard warnings. Marking shall include values, units of measurement and description for the following:
 1. Flash hazard boundary.
 2. Incident energy and working distance.
 3. Personal protective equipment (PPE) category level with requirement.

3.02 PROTECTIVE DEVICE TESTING, CALIBRATION AND ADJUSTMENT

- A. The equipment manufacturer shall provide the services of a qualified field engineer and necessary tools and equipment to test and calibrate the protective relays, ground fault relays and circuit breaker trip devices as recommended in the Study.

END OF SECTION 16053

SECTION 16054

ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Remove, relocate, extend, and abandon electrical circuits, equipment, and systems.

1.03 DEFINITIONS

- A. Abandoned: Refers to electrical facilities which are no longer in use and are to be de-energized and left in place.
- B. Removed: Refers to electrical facilities which are to be disconnected and removed from project site.
- C. Salvaged: Refers to items which are disconnected, taken out of service and turned over to Owner.

1.04 RELATED SECTIONS

- A. Section 01732 - Selective Demolition
- B. Section 16091 - Work In Existing Building
- C. Section 16120 - Wire and Cable.
- D. Section 16130 - Boxes.
- E. Section 16132 - Conduit.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Provide all materials and equipment for patching and extending work as specified in individual sections.
- B. Provide all materials necessary for work.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on drawings.

- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on field observation and existing record documents. Contractor shall verify existing conditions. Discrepancies between plans and actual conditions shall be brought to the attention of owner prior to commencement of work.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Coordinate utility service outages with utility company and owner, and schedule utility to uncover feeders.
- B. Provide temporary wiring and connections to maintain existing system in service during construction. When Contractor elects to perform work on energized equipment or circuits, use personnel experienced in such operations.
- C. Existing Electrical Service: Maintain existing utility system in service until new diverted utility service is installed, inspected, and ready to be energized.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work indicated on drawings.
- B. Remove, relocate, and extend existing installations to accommodate new construction. Remove all unused conduit. Remove all disconnected circuit conductors full length from source to device.
- C. Repair adjacent construction and finishes damaged during demolition and extension work.
- D. Maintain access to existing electrical installations which remain active. Modify installation or provide access as appropriate.
- E. Extend existing installations using materials and methods compatible with existing electrical installations or as specified.
- F. Remove with care all equipment to be relocated. Repair or replace damaged equipment as required.
- G. Where equipment is to be relocated and re-installed, thoroughly examine and document (As-Built) all power control, and telecom wiring connections to the equipment prior to any disconnecting or demolition.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and dry before reinstallation on bases. Air dry or wipe dry glass lenses and metal parts. Air dry plastic lenses to prevent static electrical charge. Coordinate baseplate mounting hole pattern of reused and new bases since these may be different.

3.05 INSTALLATION

- A. Install relocated materials and equipment as indicated. Upgrade wiring and installation method to meet current applicable codes.

END OF SECTION 16054

SECTION 16060

GROUNDING AND BONDING SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials, including:
 - 1. Power system grounding.
 - 2. Communication system grounding.
 - 3. Electrical equipment and raceway grounding and bonding.
 - 4. Structural steel grounding.
 - 5. Miscellaneous system grounding.

1.03 RELATED SECTIONS

- A. Section 03200 - Concrete Reinforcement.
- B. Section 16080 - Electrical Testing.
- C. Section 16120 - Wire and Cable.
- D. Section 16132 - Conduit.
- E. Section 16210 - Service Entrance.

1.04 REFERENCES

- A. NECA - Standard of Installation.
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code with California Amendments)

1.05 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Existing metal underground water pipe.
 - 2. Metal frame of the building.
 - 3. Concrete-encased electrode.
 - 4. Rod electrode.
- B. Grounding System Resistance: 5 ohms.

1.06 SUBMITTALS

- A. Product Data: Submit grounding electrodes and connections; for fastening components; and nameplates, labels, and markers.
- B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- C. Project Record Documents: Record actual locations of components and grounding electrodes.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience, and with service facilities within 100 miles of project.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Rod Electrodes: Copper-encased steel, 3/4-inch diameter, minimum length 10 feet.
- B. Mechanical Connectors:
 - 1. Manufacturers:
 - a. Burndy.
 - b. O.Z. Gedney.
 - 2. Heavy-duty, bolt-type, copper alloy or bronze for grounding and bonding applications, in configurations required for particular installation.
- C. Exothermic Connections:
 - 1. Type for underground and structural steel; Cadweld.
 - 2. Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.
- D. Wire:
 - 1. Stranded, copper cable.
 - 2. Foundation Electrodes: 2/0 AWG.
 - 3. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.
- E. Grounding Well Components:
 - 1. Well Pipe: 8-inch NPS by 24-inch long concrete pipe with belled end.
 - 2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

F. Insulated Grounding Bushings

1. Plated malleable iron or steel body with 150 degree Centigrade molded plastic insulating throat and lay-in grounding lug.

G. Connections To Pipe

1. For cable to pipe: UL listed bolted connection complying with NEC requirements.

H. Connections To Structural Steel, Ground Rods, Or Splices

1. Where required by the Drawings or Specifications, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds or high pressure compression type connectors.
2. Exothermic welds shall be used for cable-to-cable and cable-to-ground rod and for cable to structural steel surfaces. Exothermic weld kits shall be as manufactured by Cadweld, Thermoweld or equal. Each particular type of weld shall use a kit unique to that type of weld.
3. High-pressure compression type connectors shall be used for cable-to-cable and cable-to-ground rod connections. Connections shall be as manufactured by Thomas & Betts #53000 series, Burndy "Hy-Ground" or equal.

PART 3 - EXECUTION

3.01 EXISTING WORK

- A. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors. Patch surfaces damaged by removal of existing components.

3.02 GROUNDING AND BONDING INSTALLATION

- A. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.
- D. Provide bonding to meet Regulatory Requirements.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- F. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

- G. Do not use spring steel clips and clamps.
- H. Do not use powder-actuated anchors.
- I. Do not drill or cut structural members.

3.03 ELECTRIC SERVICE GROUND

- A. Ground the electrical service system neutral at service entrance equipment to grounding electrodes.
- B. Bond together system neutrals, service equipment enclosures, and equipment grounding conductor at service entrance.
- C. Connect the electric service grounding electrode conductors to the incoming metal water pipe system (when available, using a suitable ground clamp) and to ground rod, ground loop, or other supplemental electrode.
- D. Provide grounding and bonding at the power company's metering equipment.

3.04 EQUIPMENT GROUND

- A. Provide a complete ground system for the building consisting of copper cable, ground rods and exothermic connections to serve the service entrance, building structural steel, metallic enclosures and conduit systems.
- B. Provide a separate, insulated equipment-grounding conductor from the main service ground to each main switchboard and in all feeders and branch circuits. Terminate each end on a grounding lug, bus, or bushing. Do not use conduit as grounding conductor.
- C. Provide OZ Type "BJ" bonding jumper or equal at all expansion joints, points of electrical discontinuity or connections in conduit where firm mechanical bond is not possible, such as flexible connections, insulating couplings, etc.
- D. Ground each lighting and power panelboard by connecting the grounding conductor to the grounding stud.
- E. Ground each secondary dry-type transformer to the ground bus of the primary side panelboard. Provide a bonding jumper between the ground stud and the neutral. Ground transformer ground stud to ground loop if a ground loop is installed or the nearest structural steel member.
- F. Bond every item of equipment served by the electrical system to the building equipment ground system. This includes switchboards, panelboards, disconnect switches, receptacles, controls, fans, air handling units, pumps, and flexible duct connections.
- G. Conduit terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
- H. Provide bonding jumpers across expansion and deflection couplings in conduit runs, pipe connections to water meters, dielectric couplings in metallic cold water piping

system.

- I. Provide #2 AWG conductor bond between cold water service pipework and hot water service pipework at each water heater. Bond to gas pipework if heater is gas fired.
- J. Provide internal ground wire in flexible conduit connected at each end via grounding bushing.

3.05 COMMUNICATIONS GROUND

- A. Provide communications system-grounding conductor at point of service entrance and connect to service entrance ground bus.
- B. Use minimum No. 3/0 AWG copper conductor to communications service grounding bus.
- C. Refer to Section 16051 for Telecommunications Grounding Backbone.

3.06 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION 16060

SECTION 16061

TELECOMMUNICATIONS GROUNDING BACKBONE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Labor, materials and equipment necessary to complete the installation required for the item specified within this Section, including but not limited to:
 - 1. Telecommunication Grounding Backbone System.
 - 2. Commissioning/testing of the Telecommunication Grounding Backbone System.
- B. Related Sections:
 - 1. 16010 Basic Electrical Requirements
 - 2. 16706 Telecommunications Bonding

1.03 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. NFPA 70, National Electric Code:
 - a. Chapter 8: Communications Systems
 - b. Article 250: Grounding
 - 2. ANSI-J-STD-607-A: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 - 3. Underwriters Laboratories, Inc. (UL) UL 467: Grounding and Bonding Equipment
 - 4. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. IEEE 467: IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - b. IEEE P1100: IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems

1.04 DEFINITIONS

- A. Definitions as described in Division 1 and Section 16010 shall apply to this section.
- B. In addition, the following list of terms as used in this specification shall be defined as follows:
 - 1. "ACEG": Alternating Current Equipment Ground
 - 2. "BCT": Bonding Conductor for Telecommunications

3. "CM": Circular Mil.
4. "MBRGB": Main Building Reference Grounding Busbar.
5. "TBB": Telecommunications Bonding Backbone.
6. "TBC": Telecommunications Bonding Conductor.
7. "TGB": Telecommunication Grounding Busbar.
8. "TMGB": Telecommunication Main Grounding Busbar.

1.05 SYSTEM DESCRIPTION

- A. Overview: The Telecommunications Grounding Backbone System contains grounding bus bars, grounding conductors, bonding conductors, and connecting devices (including but not limited to pressure connectors, lugs, clamps, or exothermic welds). These components, upon completion of installation & testing, shall provide the means of a low impedance path to ground for stray voltages or spurious signals present on telecommunications media and equipment.
- B. Base Bid Work:
 1. BCT – bonding conductor from electrical service ground to TMGB; origination & destination locations as shown on the Drawings.
 2. TMGB – main telecommunications system grounding busbar; location as shown on the Drawings with the connections as shown on the Drawings.
 3. TBB – Use the TBB(s) as the main bonding conductor between the TMGB and other TGBs provided throughout a single building. The length of TBB's shall not exceed 500 feet. The TBB shall route from the MDF through each of the IDFs bonding each of the TGBs to the TMGB. Maintain TBB continuity and do not break continuity in order to bond to a TGB. Refer to Drawings for more information.
 4. TGB – telecommunications room grounding busbar; locations as shown on the, Drawings with the connections as shown on the Drawings.
- C. System Performance:
 1. Resistance: Resistance from the telecommunication system ground bus to the ground electrode and to earth shall not exceed 25 Ohms.

1.06 SUBMITTALS

- A. General: Submittal requirements as described in Section 16051 shall apply to this section.
- B. Quantity: Furnish quantities of each submittal as noted in Section 16051.
- C. Product Data Submittal
 1. Format: As described in Section 16051.
 2. Content: In addition to requirements of Section 16051, include the following:
 - a. Product Data: "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) of bonding devices and installation accessories. This data shall clearly describe the physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish.
 - b. Clearly indicate by arrows or brackets precisely the model and accessories

submitted on.

1.07 QUALITY ASSURANCE

- A. Install new, unused, and of current manufacturer for materials, equipment and parts comprising the units specified herein.
- B. Only use products and applications listed in this Section on the project unless otherwise submitted.
- C. Contractor Qualifications
 - 1. A current, active, and valid C10 California State Contractors License.
 - 2. At least five years of experience, and a minimum of five completed projects similar to scope and cost.
 - 3. Evidence of technicians qualified for the work.
 - 4. CWA and IBEW union affiliation.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 16050 for minimum delivery, storage, and handling requirements.

1.09 WARRANTY

- A. The warranty period for the telecommunications grounding system shall be 1 year from the date of acceptance.
- B. Contractor Warranty:
 - 1. Warrant installed hardware to be, under normal use and service, free from defects and faulty workmanship during the warranty period. The entire system shall be kept in operating condition at no additional material or labor costs to the Owner during the warranty period.
- C. Manufacturer Warranty:
 - 1. Warrant that all installed system components will, under normal use and service, comply with the performance of this specification for the entire warranty period. Any replacements required to comply shall be provided at no additional material or labor costs to the Owner. The Contractor shall be held responsible for making up any deficiencies in the manufacturers warranty and may be required by the Owner to post a performance bond for the entire warranty period in order to comply with these specifications.
 - 2. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department shall be located close enough to the job site area to supply replacement parts within a 4 hour period.
 - 3. The manufacturer(s) of all components shall demonstrate that a quality assurance program is in place to assure that all of the specifications are met. The program shall include, as a minimum, provisions for:
 - a. Incoming inspection of raw materials
 - b. In-process inspection and final inspection of the product
 - c. Calibration procedures of all test equipment to be used in the qualifications of

the product

4. Recall procedures in the event that out of calibration equipment is identified.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING CONDUCTORS

A. BCT:

1. Wire: Type THHN, per UL 83.
2. Conductor: Bare soft annealed copper (per ASTM B3), Class B stranded (per ASTM B8).
3. Size BCT same as or larger than TBB.
4. Insulation: Thermoplastic (such as PVC), or similar. Jacket shall be nylon, or similar.
5. Outer Color: Green.
6. Wire shall meet or exceed IEEE 383, and shall be listed as UL VW-1.
7. Wire shall have printed on the outside of the jacket the insulation grade, the conductor gauge, applicable UL jacket listings, and foot markings.

B. TBB:

1. Wire: Type THHN, per UL 83.
2. Conductor: Bare soft annealed copper (per ASTM B3), Class B stranded (per ASTM B8).
3. Size each TBB conductor as 2,000 circular-mils per linear foot from the TMGB to the furthest TGB.
 - a. Minimum Size: 6 AWG;
 - b. Maximum Size: 3/0 AWG.
4. Insulation: Thermoplastic (such as PVC), or similar. Jacket shall be nylon, or similar.
5. Outer Color: Green.
6. Wire shall meet or exceed IEEE 383, and shall be listed as UL VW-1.
7. Wire shall have printed on the outside of the jacket the insulation grade, the conductor gauge, applicable UL jacket listings, and foot markings.

C. TBC:

1. Wire: Type THHN, per UL 83.
2. Conductor: Bare soft annealed copper, Class B stranded (per ASTM B8).
3. TBC size: 6 AWG.
4. Insulation: Thermoplastic (such as PVC), or similar. Jacket shall be nylon, or similar.
5. Outer Color: Green.
6. Wire shall meet or exceed IEEE 383, and shall be listed as UL VW-1.
7. Wire shall have printed on the outside of the jacket the insulation grade, the conductor gauge, applicable UL jacket listings, and foot markings.

2.02 GROUNDING BUSBARS

- A. Material: Solid copper.
- B. Size:
 - 1. TMGB Type Busbar: 20 inches long by 4 inches high (minimum) by ¼ inch thick (minimum).
 - 2. TGB Type Busbar: 10 inches long by 2 inches high (minimum) by ¼ inch thick (minimum).
- C. Holes: Predrilled, with standard NEMA bolt hole sizing & spacing for the type of connectors used.
- D. Mounting: Standoff/support shall be insulated from the busbar.
- E. Busbars shall comply with J-STD-607-A requirements for (at a minimum) size, material, and hole pattern.
- F. Manufacturer: Chatsworth Products Inc, or equal:
 - 1. #40153-020; TMGB type busbar with standoffs
 - 2. #13622-010; TGB type busbar with standoffs

2.03 CONNECTORS

- A. Provide UL listed connectors.
- B. TBB-to-TBC “H” Tap, at Busbar
 - 1. Manufacturers, or equal:
 - a. Panduit #HTCT250-2-Q; “H” type compression tap, main = #2-250MCM, tap = #2-#6.
- C. Lugs, for TBCs
 - 1. Manufacturer: Panduit, or equal:
 - a. #LCD6-14A-L; two hole (1/4” dia. x 5/8” on center) standard barrel lug for #6 AWG conductor.
 - b. #LCD4-14A-L; two hole (1/4” dia. x 5/8” on center) standard barrel lug for #4 AWG conductor.
 - c. #LCD2-14A-Q; two hole (1/4” dia. x 5/8” on center) standard barrel lug for #2 AWG conductor.
 - d. #LCD1-14A-E; two hole (1/4” dia. x 5/8” on center) standard barrel lug for #1 AWG conductor.
 - e. #LCD1/0-38D-X; two hole (3/8” dia. x 1” on center) standard barrel lug for #1/0 AWG cond.
 - f. #LCD2/0-38D-X; two hole (3/8” dia. x 1” on center) standard barrel lug for #2/0 AWG cond.
 - g. #LCD3/0-38D-X; two hole (3/8” dia. x 1” on center) standard barrel lug for #3/0 AWG cond.

D. TBC-to-Conduit

1. Thomas & Betts #3864 threaded insulated throat grounding bushings for 4” rigid steel entrance conduits.
2. Thomas & Betts threaded insulated throat grounding bushings for conduits longer than 3’ used to protect the telecommunication grounding conductor.

E. TBC-to-TBB “H” (In-Line) Tap, at Conduit Bushings

1. Manufacturers, or equal:
 - a. Panduit #HTCT250-2-Q; “H-type” compression tap, main = #2-250MCM, tap = #2-#6.

PART 3 - EXECUTION

3.01 GENERAL

- A. Work shall comply with the Uniform Building Code, Uniform Fire Code, National Electrical Code, UL 467, and ANSI/TIA/EIA 607 standard, as well as local codes that may specify additional grounding and/or bonding requirements. If discrepancies between codes and/or standards arise, the more stringent code or specification shall prevail.
- B. Install components to manufacturers instructions and recommendations.
- C. Identify grounding and bonding conductors according to local codes.
- D. Terminations must be accessible for inspection and maintenance during the life of the system.

3.02 INSTALLATION

A. Pathways:

1. When routing a TBB conductor through conduit, bond both ends of metallic conduit longer than 3 feet to the grounding conductor using a #6 AWG bonding conductor.
2. Bond telecommunication conduit, cable tray, cable runway, equipment racks, and other metallic telecommunication infrastructure components to the nearest TMGB using a TBC and appropriate grounding hardware.
3. Install grounding conductors in conduit to protect them from physical damage.

B. BCT and TBB:

1. Wire insulation used as BCT and TBB conductors shall be green. .
2. Install TBB(s) and/or BCT in a manner that will protect them from physical and mechanical damage.
3. Route TBBs and/or BCT in the shortest possible path and parallel to building lines.
4. Install the TBB and/or BCT without splices. If this is not possible, contact the Engineer for direction.
5. Enclose all conductors within metallic conduit.

C. TMGB and TGB Busbars:

1. Mount on wall in location shown on Drawings, on insulating standoffs.
2. Install TMGB and TGBs such that the bar is 2 inches from the wall.
3. Thoroughly clean non electrotin-plated bus bars prior to fastening the conductors, bolts, or connectors to the bus bar.
4. Attach lugs to bus with appropriate size cadmium bronze bolt, flat washer and Belleville washer.
5. Torque connections.

D. TBC:

1. Provide TBC conductors as bonding jumpers for bonding equipment and other metallic components within a Telecommunications Room to the grounding busbar. Use #6 up to 25 feet long; refer to drawings for sizing longer than 25 feet.
2. Bonding conductors shall be continuous. Splices are not allowed in TBCs.
3. Route TBCs in the shortest possible path.
4. Use right-angles for turns utilizing a 1-foot (minimum) bend radius.

E. Metallic Raceways;

1. If TBB and/or BCT routes through conduit longer than 1 meter, bond metallic conduit to conductor at both ends.
2. Bond metallic raceways for telecommunications cabling (conduit, cable tray, and other metallic telecommunication infrastructure components) located within the same room or space as the TMGB or TGB to the nearest telecommunication grounding busbar.

F. Panelboards:

1. Bond the panelboard's Alternating Current Equipment Ground (ACEG) bus (where equipped) or the enclosure, when dedicated to serving a Telecommunication space, to a busbar (either TMGB or TGB).

3.03 LABELING

A. General Requirements:

1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner's Representative before installation.
2. Scope Of Labeling: Label the following components:
 - a. BCT: Affix label as close as practical to each connection point (at the electrical service ground and TMGB).
 - b. TBB: Affix label as close as practical to each connection point (at the TMGB and to bonding connections at TGBs).
 - c. TMGB and TGBs: Affix label as shown on Drawings or, if not shown, on front-top of busbar.
 - d. TBCs: Affix label as close as practical to each end of the conductor.
3. Labels shall be permanent.

B. Label Format:

1. Labels shall be permanent with machine-generated text; hand written labels will not be accepted.
2. Labels on conductors (e.g., TBB and TBCs) shall fully wrap around conductors with a self-laminating feature to provide permanent marking.

C. Identifier Assignment:

1. General:

- a. Separate label fields by a hyphen, unless otherwise noted.
- b. Assign identifiers according to current practice and as approved by Owner before installation.

2. BCT:

- a. First field: "BCT" (the conductor type).
- b. Example: "BCT"

3. TBB:

- a. First field: "TBB" (the conductor type).
- b. Second field: a unique sequential number, for example, "01".
- c. Example: "TBB-01"

4. TMGB/TGB (Ground Busbars):

- a. First field: the busbar type, for example, "TMGB" or "TGB"
- b. Second field: the IDF's identity (IDF identifier's suffix) where the conductor is installed; for example, "MDF-G.1".
- c. Example: "TGB-MDF-G.1"

5. TBC (Bonding Conductors):

- a. First field: the conductor type, for example., "BC"
- b. Second field: the IDF's identity (IDF identifier's suffix) where the conductor is installed; for example, "MDF-G.1".
- c. Third field: a unique two-digit number
- d. Fourth field: describe the device, equipment, component, or raceway being bonded.
- e. Example: "BC-MDF-G.1-01 (CABLE TRAY)"

3.04 RECORDS

- A. Telecommunication Grounding System records shall fully conform to TIA/EIA-606-A Administration Standards. Each component shall have as a minimum, the information as outlined in Table 4.7-1 of TIA/EIA-606-A.

3.05 CERTIFICATION

- A. Obtain and record ground resistance measurements from the ground bus to earth. Provide additional bonding and add grounding electrodes as required to comply with resistance limits specified under this Section.

- B. Include computer-generated records of measured resistance values with the Operation and Maintenance Manual furnished to the Owner at the time of project closeout.

END OF SECTION 16061

SECTION 16070
SUPPORTING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Supporting devices, including:
 - 1. Conduit and equipment supports.
 - 2. Fastening hardware.

1.03 COORDINATION

- A. Coordinate size, shape and location of concrete pads with section on cast-in-place concrete.
- B. Coordinate size, shape and requirements for utility company equipment with local utility company.

1.04 QUALITY ASSURANCE

- A. Provide support systems adequate for weight of equipment and conduit, including wiring which they carry.

1.05 SUBMITTALS

- A. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of component used.
- B. Anchor Bolts and Studs: Submit drawings indicating locations and dimensioned where proposed to be used in structural steel.
- C. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and provide design drawings.
- D. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and spacings, identifying components and listing their strengths.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. B-Line.
- B. Kindorf.

C. Unistrut.

2.02 MATERIAL

A. Support Channel: Galvanized or painted steel.

B. Hardware: Galvanized or painted steel.

C. Provide epoxy or PVC coated materials for corrosive environments.

D. Spring steel clips.

2.03 CONCRETE FASTENERS

A. Provide expansion-shield type concrete anchors.

B. Provide powder driven concrete fasteners with washers.

2.04 CONCRETE INSERTS

A. Provide pressed galvanized steel, concrete spot insert, with oval slot capable of accepting square or rectangular support nuts of 1/4 inch to 1/2 inch diameter thread for rod support.

2.05 THREADED ROD

A. Provide steel threaded rod, sized for the load unless otherwise noted on the Drawings or in the Specifications.

2.06 CONSTRUCTION CHANNEL

A. Provide 1-1/2 inch by 1-1/2 inch, 12 gauge galvanized steel channel with 17/32-inch diameter bolt holes, and 1-1/2 inch on center in the base of the channel.

2.07 CONSTRUCTION CHANNEL END CAPS

A. Provide white PVC end caps that total enclose the end of construction channel.

2.08 CONDUIT STRAPS

A. One hole strap, steel or malleable iron, with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.

1. Use malleable strap with spacers for exterior and wet locations.
2. Use steel strap without spacers for interior locations.

B. Steel channel conduit strap for support from construction channel.

C. Steel conduit hanger for pendant support with threaded rod

D. Steel wire conduit support strap for support from independent #12 gauge hanger wires.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps or bolts.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; sheet metal screws in sheet metal studs and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not use powder-actuated anchors on new concrete structure.
- E. Do not drill structural steel members. Where attachment is required to be made to structural members, provide one of the following methods;
 - 1. Provide steel mounting plates rigidly welded to the steel members of sufficient size and thickness for application. Plates shall be provided with mounting studs to accommodate the equipment to be supported.
 - 2. Provide powder actuated fasteners with threaded studs suitable for use in steel to accommodate equipment to be supported. Maximum shank diameter of 0.205". All proposed locations and sizes shall be submitted to the A/E for review prior to installation.
- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- G. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment, and where shown on Drawings.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- J. Do not support conduit from ceiling wire supports.
- K. Do not use spring steel clips and clamps or support conduits by individual hanger wires.
- L. Where multiple runs of conduit can be run grouped together, run conduit in racks supported from the building structure. Provide for future use of rack by properly planning routing of conduits in and through restricted areas such as through walls and around mechanical and electrical equipment.
- M. Use spring steel clips with EMT for individual branch circuits and device boxes in drywall construction.
- N. Install PVC end caps on all construction channel.
- O. Provide additional support backing in stud walls prior to sheet rocking or installation

of exterior metal wall panels as required to adequately support wall mounted interior and exterior lighting fixtures and outlet boxes.

3.02 ANCHORAGE

- A. All floor mounted, free standing electrical equipment such as transformers, switchboards, distribution boards, motor control centers, etc. shall be securely fastened to the floor structure.
- B. Anchorage of electrical equipment shall comply with the seismic requirements as outlined in Section 16010: Basic Electrical Requirements.

END OF SECTION 16070

SECTION 16071

SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It complements optional seismic construction requirements in the various electrical component Sections.

1.03 DEFINITIONS

- A. BOCA: BOCA National Building Code.
- B. SBC: Standard Building Code.
- C. UBC: Uniform Building Code.
- D. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.
- E. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independent of other mobile structural elements during an earthquake.

1.04 SUBMITTALS

- A. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic restraint component used.
 - 1. Anchor Bolts and Studs: Tabulate types and sizes, complete with report numbers and rated strength in tension and shear as evaluated by an agency approved by authorities having jurisdiction.
- B. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and show designs and calculations signed and sealed by a professional engineer.
 - 1. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - 2. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and spacings, identifying components and listing their strengths. Indicate direction and value of forces transmitted to the structure during seismic events.
 - 3. Preapproval and Evaluation Documentation: By an agency approved by authorities having jurisdiction, showing maximum ratings of restraints and the

basis for approval tests or calculations.

- C. Product Certificates: Signed by manufacturers of seismic restraints certifying that products furnished comply with requirements.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results of seismic control devices for compliance with requirements indicated.

1.05 QUALITY ASSURANCE

- A. Comply with seismic restraint requirements in UBC, unless requirements in this Section are more stringent.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing seismic engineering services, including the design of seismic restraints, that are similar to those indicated for this Project.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated.

1.06 PROJECT CONDITIONS

- A. Project Seismic Zone and Zone Factor as Defined in UBC: Zone 4.
- B. Occupancy Category as Defined in UBC: 1 Essential Facility.

1.07 COORDINATION

- A. Coordinate layout and installation of seismic bracing with building structural system and architectural features, and with mechanical, fire-protection, electrical, and other building features in the vicinity.
- B. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. B-Line Systems, Inc.
 - 2. Erico, Inc.
 - 3. GS Metals Corp.
 - 4. Loos & Company, Inc.
 - 5. Mason Industries, Inc,
 - 6. Powerstrut.
 - 7. Thomas & Betts Corp.

8. Unistrut Corporation.

2.02 MATERIALS

- A. Use the following materials for restraints:
1. Indoor Dry Locations: Steel, zinc plated.
 2. Outdoors and Damp Locations: Galvanized steel.
 3. Corrosive Locations: Stainless steel.

2.03 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

- A. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.
- B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.
- C. Concrete Inserts: Steel-channel type.
- D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
- E. Welding Lugs: Comply with MSS SP-69, Type 57.
- F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.
- G. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.
- H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.04 SEISMIC BRACING COMPONENTS

- A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch-thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.
1. Materials for Channel: ASTM A 570, GR 33.
 2. Materials for Fittings and Accessories: ASTM A 575, ASTM A 576, or ASTM A 36.
 3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.
 4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.
- B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.

- C. Cable-Type Bracing Assemblies: Zinc-coated, high-strength steel wire rope cable attached to steel thimbles, brackets, and bolts designed for cable service.
 - 1. Arrange units for attachment to the braced component at one end and to the structure at the other end.
 - 2. Wire Rope Cable: Comply with ASTM 603. Use 49- or 133-strand cable with a minimum strength of 2 times the calculated maximum seismic force to be resisted.
- D. Hanger Rod Stiffeners: Slotted steel channels with internally bolted connections to hanger rod.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Generator Sets: Comply with Division 15 Section 15070 Vibration Isolation.

3.02 INSTALLATION

- A. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated.

3.03 STRUCTURAL ATTACHMENTS

- A. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to spread structural loads and reduce stresses.
- B. Attachments to New Concrete: Bolt or weld to channel-type concrete inserts or use expansion anchors.
- C. Attachments to Existing Concrete: Use expansion anchors.
- D. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.
- E. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.
- F. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.
- G. Attachments to Wood Structural Members: Install bolts through members.
- H. Attachments to Steel: Bolt to clamps on flanges of beams or on upper truss chords of bar joists.

3.04 ELECTRICAL EQUIPMENT ANCHORAGE

- A. Anchor rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.
- B. Anchor panelboards, motor-control centers, motor controls, switchboards, switchgear,

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Items for identification of electrical products installed under Division 16.

1.03 SUBMITTALS

- A. Submit product data.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. W.H. Brady Co.
- B. Carlton Industries, Inc.
- C. Seton Nameplate Co.

2.02 MATERIALS

- A. Nameplates: Provide engraved three-layer laminated plastic nameplates with lettering etched through the outer covering. Character and background colors shall conform to the following system color code:

<u>Background.</u>	<u>Char.</u>	<u>System</u>
Black	White	Normal Power & Lighting
Yellow	White	Standby Emergency Systems
Orange	White	Isolated Ground
Blue	White	UPS
Green	White	Security
Red	White	Fire Alarm

- B. Wire and Cable Markers: Provide vinyl cloth markers with split sleeve or tubing type.
- C. Underground Warning Tape:
 - 1. Manufactured polyethylene material and unaffected by acids and alkalies.
 - 2. 3.5 mils thick and 6 inches wide.
 - 3. Tensile strength of 1,750 pounds per square inch lengthwise.
 - 4. Printing on tape shall include an identification note BURIED ELECTRIC LINE, and a caution note CAUTION. Repeat identification and caution notes over full length of tape. Provide with black letters on a red background conforming to

APWA recommendations.

- D. Panelboard Directories: Provide typed circuit directory for each panelboard. Mount circuit directory in a permanent, clear Lexan card holder located on inside of door on panelboard.
- E. Conduit Markers: Flexible vinyl film with pressure sensitive adhesive backing and printed markings.
 - 1. Include following identifying tiles on orange background except as noted.
 - a. Typical:
 - 1) Type: Example - AC 60 hertz.
 - 2) Load: Example - Lighting and power.
 - 3) Voltage: Example - 480 VAC/3 phase.
 - b. As Noted:
 - 1) If more than one type of power is available in a conduit, mark with title "Electrical" on orange background.
 - 2) Limit switch controls, air conditioning controls and diffuser controls with title "Control" on orange background.
 - 2. Conduit that Contains Protective Communication Systems: Provide exact content and title on blue background; install and locate as specified for conduit.
- F. Conduit Markers and Letter Size:

Outside Diameter of Conduit (inches)	Width of Color Band	Size of Letter and Numerals
1/2 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/4 to 3-1/4	10	1
3-1/2 & Larger	12	1-1/4

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside face of recessed panelboard doors in finished locations.
- D. Embossed tape will not be acceptable.
- E. Provide underground tape at electrical installations.

3.02 WIRE AND CABLE LABELING

- A. Provide wire markers on each conductor in splice boxes, pull boxes, and at first load connection on homerun. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.
- B. Identify branch circuit or feeder number for power and lighting circuits on cover of pull and junction boxes with indelible marker.

3.03 EQUIPMENT LABELING

- A. Provide nameplates to identify all electrical distribution and control equipment.
- B. Engraved, Laminated Plastic Nameplates: 1/4-inch letters, equipment designation; 1/8-inch letters, source circuit number. Provide for:
 - 1. Meters.
 - 2. Panelboards.
 - 3. Switchboards including each individual device or piece of equipment within a switchboard.
 - 4. Motor control center including each individual device with a motor control center.
 - 5. Enclosed switches, starters, circuit breakers and contactors. Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, design letter, service factor, and voltage/phase rating. Provide phenolic nameplate on cover exterior to indicate motor served.
 - 6. Transformers.
 - 7. Generator.
- C. Identify junction boxes by circuit number with legible permanent ink marker.

3.04 BOX AND COVER COLOR CODING

- A. Fire Alarm Wiring: Red.
- B. Emergency System Wiring: Yellow enamel.

3.05 CONDUIT MARKERS

- A. Location of Identifying Markers: At each end of conduit run and at intermediate points 50 feet maximum on center.

3.06 ELECTRICAL SCHEMATICS

- A. Provide copy of electrical schematic single line diagram complete with feeder sizes and equipment ratings at each electrical room. Diagram shall reflect As Built conditions and shall be reproduced on bond paper at a minimum half-size of the Contract Drawings.
- B. Electrical schematic shall be installed within a hinged frame with transparent shatter-free cover to provide protection and allow updates to be made.

END OF SECTION 16075

SECTION 16080

ELECTRICAL TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Test electrical systems and equipment.
- B. These tests are required to determine that the equipment involved may be safely energized and operated.
- C. Perform tests by and under the supervision of fully experienced and qualified personnel. Advise each respective manufacturer's representative of tests on their equipment.
- D. Record all test data.
- E. Each section of Division 16 that has products or systems listed herein incorporate this section by reference and is incomplete without the required tests stated herein.

1.03 REFERENCES

- A. ANSI/IEEE C37.20 - Circuit Breakers, Switchgear, Substations, and Fuses.
- B. NETA - National Electrical Testing Association
- C. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit test report forms for review a minimum of 90 days prior to requesting a final review by A/E.
- B. Furnish six individually bound copies of test data. Neatly type and arrange data. Include with the data the date tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken, both prior to and after any corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation.
- C. A/E will retain one copy. Remaining copies will be returned to Contractor for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS (Not used.)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish proposed test procedures, recording forms, list of personnel and test equipment for A/E review.
- B. Follow recommended procedures for testing as published by test equipment manufacturer.

3.02 GENERAL TESTS

- A. Circuit continuity: Test all feeder and branch circuits for continuity. Test all neutrals for improper grounds.
- B. Equipment operations: Test motors for correct operation and rotation.
- C. Lighting control circuits: Test lighting circuits for correct operation through their control devices.
- D. Alarm and interlock systems: Produce malfunction symptoms in operating systems to test alarm and interlock systems. In addition, all specific tests described in the fire alarm system shall be performed.

3.03 CIRCUIT BREAKERS

A. Insulated Case/Molded Case

1. Visual and Mechanical Inspection

- a. Compare nameplate data with drawings and specifications.
- b. Inspect circuit breaker for correct mounting.
- c. Operate circuit breaker to insure smooth operation.
- d. Inspect case for cracks or other defects.
- e. Verify tightness of accessible bolted connections and/or cable connections by calibrated torque-wrench method in accordance with manufacturer's published data. Perform thermographic survey.
- f. Inspect mechanism contacts and arc chutes in unsealed units.

2. Electrical Tests (for all circuit breakers 100A and above)

- a. Perform a contact-resistance test.
- b. Perform an insulation-resistance test at 1000 volts dc from pole-to-pole and from each pole-to-ground with breaker closed and across open contacts of each phase.
- c. Perform insulation resistance test at 1000 volts dc on all control wiring. Do not perform the test on wiring connected to solid state components.
- d. Perform adjustments for final settings in accordance with coordination study supplied by owner.
- e. Perform long-time delay time-current characteristic tests by passing 300 percent rated current through each pole separately unless series testing is required to defeat ground fault functions.
- f. Determine short-time pickup and delay by primary current injection.
- g. Determine ground-fault pickup and time delay by primary current injection.

- h. Determine instantaneous pickup current by primary injection using run-up or pulse method.
- i. Verify correct operation of any auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, and antipump function.
- j. Verify the calibration of all functions of the trip unit by means of secondary injection.

3. Test Values

- a. Bolt-torque levels shall be in accordance with Table 10.12 unless otherwise specified by manufacturer.
- b. Compare microhm or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than 25 percent. Investigate any value exceeding manufacturer's recommendations.
- c. Insulation resistance shall not be less than 100 megohms.
- d. Trip characteristic of breakers shall fall within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
- e. For molded-case circuit breakers all trip times shall fall within Table 10.7. Circuit breakers exceeding specified trip time at 300 percent of pickup shall be tagged defective.
- f. For molded-case circuit breakers instantaneous pickup values shall be within values shown on Table 10.8.

3.04 WIRE AND CABLE

- A. Test insulation resistance of each main feeder and service after the installation is complete but before the connection is made to its source and point of termination.
- B. Test insulation resistance using Biddle Megger or equivalent test instrument at a voltage not less than 1,000 volts DC. Measure resistance from phase-to-phase and phase-to-ground. In circuits where insulation test value is lower than 1 megohm, remove and replace conductor and retest.
- C. Visually inspect connections of every branch circuit for tightness.
- D. Ensure that grounding conductor is electrically continuous.
- E. Test branch circuits against grounds, shorts or other faults.
- F. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- G. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment.
- H. Test system for stray currents and ground shorts. If stray currents and shorts are detected, eliminate or correct as required.

3.05 WIRING DEVICES

- A. Operate switches at least twice.
- B. Test every convenience outlet with plug-in device for proper phasing and grounding.

C. Demonstrate operation of lighting circuits and lighting control systems.

3.06 ELECTRICAL SWITCHGEAR AND PANELS

A. Before Energization:

1. Visually inspect connections for tightness and correctness.
2. Verify proper fusing.

B. After Energization:

1. Verify proper voltage with system operating at load conditions.
2. Verify proper operation.
3. Operate every circuit breaker, switch and contactor.
4. Measure line amperes with system operating at load conditions.
5. Modify circuit breaker and relay settings as required.
6. Megger meter centers for opens, shorts and grounds.
7. Thermographic Tests:
 - a. With system operating at load conditions, perform thermographic test on switchgear, bus duct, control centers, distribution panelboards, lighting panelboards and equipment feeders using an infrared temperature scanning unit. Provide thermograph tests performed by Independent Contractor.
 - b. Tighten or correct connections with higher temperatures than acceptable. After corrections have been made, perform thermograph test to confirm that problems have been corrected.

3.07 GROUND FAULT

A. Factory test switchboards at the manufacturer's factory prior to shipment as specified herein:

1. Furnish a ground fault protection system test for circuit testing and verification of the tripping of the ground fault relays at the factory location. Pass predetermined values of current through the relay sensors and measure the relay tripping time for each phase and the neutral sensor (if one is required). Compare the measured time-current relationships to the tri-characteristic curves for each relay. If the relay trips outside the range of values indicated on the curve, replace or recalibrate the relays. Include a polarity verification of the interconnection of the ground sensor circuits as a part of the test.
2. Have the proper voltages applied to their circuits and satisfactory operation demonstrated for additional auxiliary, pilot, control relays, electrically operated breakers, shunt-trip operated breakers, switches, etc.
3. Furnish in accordance with NFPA 70 Section 230-95(c), test results certified by the switchboard manufacturer. One reviewed copy to be available at the job site for review by the authorities having jurisdiction.
4. Upon completion of the factory ground fault protection system tests, the current and time adjustment on each relay are to be set on their minimum values.

- B. After construction work is complete and prior to energizing switchboards, field test ground fault protection system; provide reset to manufacturer's recommended setting for both current and time by Independent Contractor.
 - 1. The test procedure is to be similar to that specified for the factory test.
 - 2. Notify A/E in writing at least two weeks prior to the day of the field test. A/E may witness the field test if he so desires.
 - 3. Furnish all field test results certified by the testing company listed hereinbefore.

3.08 SECONDARY GROUNDING

- A. Test service entrance ground resistance.
- B. Provide additional made-electrodes if resistance is more than 5 ohms.
- C. Test grounding system resistance within building at a minimum of ten locations.

3.09 PACKAGED ENGINE GENERATOR SYSTEM

- A. Refer to Specification Section 16231: Engine Generator.
- B. Demonstrate operation of standby system with voltage check while the entire electrical system is operating at system full load condition to assure proper operation of generator, transfer switches, etc.
- C. Simulate standby power conditions by operating main overcurrent devices to simulate a loss of main electrical power to the building.
- D. Verify operation of all transfer switches and operation of all equipment on standby power. Check and adjust all delays and timing sequences.
- E. Perform a full load test of the generator by applying a resistive load bank to system equal to full load rating of generator for four hours. Perform stepped load tests. Record generator voltage under the following step load conditions.
 - 1. 0% - 50%
 - 2. 50% - 100%
 - 3. 100% - 50%
 - 4. 50% - 0%
 - 5. 0% - 75%
 - 6. 75% - 0%
- F. During test, record the following at 20-minute intervals:
 - 1. Kilowatts.
 - 2. Amperes.
 - 3. Voltage.
 - 4. Coolant temperature.
 - 5. Room temperature.
 - 6. Frequency.
 - 7. Oil pressure.
- G. Test alarm and shutdown circuits by simulating conditions.

- H. Test insulation resistance of generator field and exciter windings.
- I. Test sound level at 20 linear feet from engine. Verify that sound pressure level is less than 95 dbA.
- J. Based on vibration analysis, select vibration isolators and other dampening devices required to provide a smooth running installation.

END OF SECTION 16080

SECTION 16091

WORK IN EXISTING BUILDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Relocate, rewire, or abandon electrical equipment and systems required in conjunction with work in existing building.
- B. Temporary provisions for all existing and/or new circuits to maintain power to occupancies in adjacent areas.
- C. Coordinate disposition of all removed equipment with the Owner.

1.03 DEFINITIONS

- A. Abandoned: Refers to electrical equipment and systems which are no longer in use and are to be de-energized and left in place.
- B. Removal: Refers to electrical equipment and systems which are not to be reused and are to be removed from the job site and disposed of as directed by the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide materials to match existing construction unless specified elsewhere in these contract documents. Provide materials which comply to local codes and UL, and properly apply to their intended function.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Visit and inspect the job site prior to bidding and become familiar with all existing conditions. Include the cost of the work required to accommodate the existing conditions in the bid proposal.
- B. Provide a typed inventory (include pictures as necessary) of all equipment and facilities which are damaged or not operating properly at the time construction commences. Any damage or inoperative equipment which is discovered during the course of construction and is not itemized on the written inventory will be assumed to have been caused by the contractor, and the contractor will be responsible for repair or replacement at no additional cost.

3.02 RENOVATION

- A. Relocate all existing material required to accommodate the new construction whether or not the existing material is shown on Drawings.
- B. Removal of all equipment or systems identified on drawings to be removed, including all supports, appurtenances and accessories associated with equipment or systems.
- C. Coordinate the work with Division 15. Determine which items and equipment are to remain, to be relocated, or be removed.
- D. Connect all loads which are existing and are to remain to the new distribution system as required to maintain their proper operation.

3.03 EXISTING RACEWAYS

- A. Reuse existing raceways where possible and where permitted by local codes. Remove old conductors from raceway. Clean raceway with mandrel followed by clean mop/pig. Rework existing raceways where required. Secure all existing raceways reused which are loose or not properly connected. Paint existing raceways when exposed to view to match surroundings.
- B. Fasten existing boxes securely.

3.04 NEW RACEWAYS

- A. Provide new raceways where existing raceways cannot be reused or where raceways do not exist in order to provide a complete system as shown on the drawings.
- B. Where raceways must be exposed to view, use surface metal raceway such as Wiremold, securely fastened, painted to match surroundings. Provide number of coats of paint as required to cover primer coat or original finish of wiremold or raceway.

3.05 EXISTING WIRING DEVICES

- A. Remove foreign material from existing junction boxes to be reused.
- B. Replace device cover plates with new cover plates.
- C. Replace existing light switches with new switches.
- D. Replace existing receptacles with new receptacles.

3.06 EXISTING TELEPHONE OUTLETS

- A. Remove foreign material from existing junction boxes to be reused.
- B. Replace all telephone outlet coverplates with new coverplates.

3.07 EXISTING LIGHT FIXTURES

- A. Existing light fixtures to be reused:
 - 1. Clean reflective surfaces, lenses, and exposed surfaces.

2. Relamp with new lamps.
 3. Repair or replace lampholders, ballasts, wiring, and door latching and hinging mechanisms.
 4. Reconnect to branch circuit wiring; tighten connections.
- B. Existing light fixtures to be reused may be replaced with new fixtures to match existing, if in Contractor's opinion, costs to Owner would be lower.

3.08 EXISTING CEILINGS

- A. Provide a typewritten list of existing damaged ceilings and ceiling tiles to be disturbed as part of the work. Disregard rooms in which ceilings are to be repaired and replaced. Correlate list to room numbers indicated on drawings.
- B. Mark damaged ceilings and ceiling tiles with easily removable red 'stick-on' labels, minimum 2 square inches.
- C. Submit list prior to performing work and do not start work until list is reviewed by A/E and Owner; otherwise repair and replace damaged ceilings and ceiling tiles.

3.09 EXISTING PANELBOARDS

- A. Existing panelboards to be reused:
1. Clean interiors and exteriors.
 2. Inspect for damage. Notify A/E if repairs or damaged components need replacing.
 3. Tighten conduit and wire terminations.
- B. Verify panelboards and panelboard feeders are of adequate capacity for loads to be served.
1. Activate loads connected to panelboards to achieve full load condition.
 2. Measure and record amperage readings of phase and neutral conductors of panelboard's feeders.
 3. Provide typewritten record of recorded measurements to the A/E for review.
- C. Provide new typewritten circuit directory.
- D. Provide new nameplate for each panelboard.

3.10 EXISTING WIRING

- A. Inspect existing wiring which is to be disturbed for damage. Repair or replace damaged wiring.
- B. Assure integrity of existing wiring insulation:
1. Megger wiring phase to phase, phase to neutral, phase to ground, and neutral to ground.
 2. Record megger results. Provide typewritten record of results to A/E for review.
 3. Repair defective insulation to a dielectric value equal to that of wire of the same type and age.

- C. Secure and label existing wiring which is to be disturbed.
- D. Tighten existing wiring terminations and connections.

3.11 SHUTDOWNS OF ELECTRICAL SERVICES

- A. Establish a schedule of shutdown(s) complete with starting time and duration.
- B. Present schedule to Owner for approval.
- C. Revise schedule as necessary to coordinate with Owner.
- D. Beyond any scheduled shutdowns, maintain continuity of electrical service to all existing facilities.

3.12 PHASING

- A. Provide temporary circuits as required to allow existing building functions to continue during day construction period. Comply with all schedules and phasing conditions as described in Division 1.

END OF SECTION 16091

SECTION 16120
WIRE AND CABLE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Wire and cable, including:
 - 1. Building wire.
 - 2. Cable.
 - 3. Wiring connections and terminations.

1.03 RELATED SECTIONS

- A. Section 16060 - Grounding and Bonding Systems.
- B. Section 16080 - Electrical Testing.
- C. Section 16130 - Boxes.
- D. Section 16132 - Conduit.
- E. Section 16140 - Wiring Devices.
- F. Section 16150 - Wire Connections and Devices.

1.04 REFERENCES

- A. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.05 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Wire and Cable:
 - 1. Carol.
 - 2. Southwire.
 - 3. Triangle PWC, Inc.
- B. Connectors:
 - 1. Burndy.
 - 2. T & B.
 - 3. 3M.
- C. Power Distribution Blocks:
 - 1. IIsco.
 - 2. Square D.

2.02 BUILDING WIRE

- A. Thermoplastic-Insulated Building Wire: NEMA WC 5.
- B. Rubber-Insulated Building Wire: NEMA WC 3.
- C. Feeders and Branch Circuits Larger Than No. 6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN, XHHW, RHW.
- D. Feeders and Branch Circuits No. 6 AWG and Smaller: Copper conductor, 600 volt insulation, THW, THHN/THWN; smaller than No. 8 AWG, solid conductor.
- E. Control Circuits: Copper, stranded conductor 600 volt insulation, THW, THHN/THWN.
- F. Plenum Rated Cable: Provide plenum rated cable where cable is installed exposed in plenums.
- G. Wiring types BX and MC will not be acceptable for use on this project.

2.03 WIRING CONNECTIONS AND SPLICES

- A. Connect and splice wire No. 8 AWG and smaller with self-insulating, wire nut connectors.
- B. Terminate and splice all No. 6 AWG and larger copper conductors, except for load side lugs on Class I and II switchboards, panelboards, motor control centers, fusible switches, circuit breakers, transformers and individual motor controllers with high conductivity, wrought copper, color-keyed compression connector similar to T & B Series 54100 for terminal connection; Series 54500 for two-way copper-to-copper splices; and Series 54700 for tapping and pigtailing copper conductors.
- C. Motor Connections: 3M Series 5300-5304.

- D. Set screw type connectors are only acceptable on the load side lugs of Class I and II switchboards, panelboards, circuit breakers, fusible switches and on individual motor controllers.
- E. Where three or more conductors larger than No. 8 AWG are installed in wiring gutter, utilize a screw-type power distribution block. Utilize split-bolt mechanical connector, filled and taped for smooth joint, only where specifically requested by Contractor and approved by A/E.

PART 3 - EXECUTION

3.01 GENERAL WIRING METHODS

- A. Use no wire smaller than No. 12 AWG for power and lighting circuits, and no smaller than No. 14 AWG for control wiring. Provide minimum of No. 12 AWG for all switch legs. Provide neutral conductor of the same size as the phase conductors to which it is associated.
- B. Use No. 10 AWG conductor minimum for 20 ampere, 120 volt branch circuits longer than 100 feet.
- C. Provide homerun conductors of continuous length without joint or splice from overcurrent device to first outlet.
- D. Provide main service and feeder conductors of continuous length without joint or splice for their entire length.
- E. Install wiring in conduit, unless indicated otherwise.
- F. Neatly train and lace wiring inside boxes, panelboards, switchgear, motor control centers, wiring gutters, and other equipment using Thomas & Betts "Ty-Wraps."
- G. Provide equal conductor lengths for all parallel circuits.
- H. Provide individual neutral for branch circuits. Multi-wire 120V branch circuits from 3-phase panelboards shall utilize one neutral conductor for MAXIMUM of three ungrounded conductors derived from different phases.
- I. Drawings indicate proposed circuiting only, and do not indicate every conductor unless intent is unclear and further clarification is required. Provide the necessary travelers for all three-way and four-way switches.
- J. Tag each circuit in an outlet box where two or more circuits run to a single outlet as a guide for the fixture hanger in making connections.

3.02 WIRING INSTALLATION IN RACEWAYS

- A. Pull conductors into raceway at the same time. Use UL listed wire pulling lubricant. Do not exceed manufacturer's recommended tension.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Remove and discard conductors cut too short or installed in wrong raceway. Do not install conductors which have been removed from a raceway.
- E. Do not install conductors in conduit which contains wires already in place.

3.03 WIRING CONNECTIONS AND TERMINATIONS

- A. Make taps and splices in accessible junction or outlet boxes only.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- D. Provide joints in branch circuits only where such circuits divide. Where circuits divide, provide one through circuit to which the branch is spliced from the circuit. Do not leave joints in branch circuits for fixture hanger to make. Make all taps and splices with approved type compression connector.
- E. Terminate spare conductors with electrical tape.
- F. Identify and label all conductor terminations as specified in electrical identification.
- G. Properly terminate indicated conductors in equipment furnished and provide properly sized lugs.

3.04 COLOR CODING

- A. Color code distribution systems as follows:

1. 120/208V System:

Phase	Color
A	Black
B	Red
C	Blue
N	White
G	Green

2. 277/480V System:

Phase	Color
A	Brown
B	Orange
C	Yellow
N	Gray/White
G	Green

3. For areas where local authority color coding differs from that specified, contact A/E for instructions.

- B. Provide color coding throughout the full length of all wire No. 6 and smaller. Identification by permanent paint bands or tags at the outlets will be acceptable for wire sizes larger than No. 6. Provide the same color and shade of color throughout the project.

3.05 FIELD QUALITY CONTROL

- A. Inspect wire and cable for physical damage and proper connection.
- B. Torque test conductor connections and terminations to manufacturer's recommended values.

END OF SECTION 16120

SECTION 16130

BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Wall and ceiling outlet boxes, floor boxes, and pull and junction boxes.

1.03 RELATED SECTIONS

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.
- C. Section 16120 - Wire and Cable.
- D. Section 16131 - Empty Raceway Systems.
- E. Section 16132 - Conduit.
- F. Section 16140 - Wiring Devices.

1.04 REFERENCES

- A. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- B. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
- C. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code with California Amendments)

1.05 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
- D. Record Documents:
 - 1. Provide as-built plan and profile drawings of all high voltage and medium and low voltage duct banks and pull boxes. Show all utilities encountered.
 - 2. Utilize sheets for plan and profile drawings of same size as Drawings. Coordinate

scale of drawings with A/E.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

- A. Provide galvanized or cadmium-plated pressed steel outlet boxes suitable for the conditions of each outlet. Provide multi-gang outlets of single box design; sectional boxes will not be acceptable.
- B. Provide deep type cast metal outlet boxes located in damp locations exposed to weather or exposed areas subject to damage, or where exposed within the building up to 8'-0" above finished floor, complete with gasketed cover and threaded hubs.
- C. Provide outlet boxes of sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of CEC, and not less than 1-1/2 inch deep unless shallower boxes are required by structural conditions and are especially approved by A/E.
- D. Provide PVC type outlet boxes only in corrosive areas rated as NEMA 13X.
- E. Provide 4-inch octagonal ceiling outlet boxes.

2.02 FLOOR BOXES

- A. Provide fully adjustable, cast iron, or formed steel floor boxes for installation in cast-in-place concrete floors. Refer to Section 16140: Wiring Devices for floor mounted service boxes.

2.03 TILE BOX

- A. Provide outlet boxes for installation in tile or concrete block walls.
- B. Standard outlet boxes with raised, square corners and device covers are acceptable.
- C. ANSI/NEMA OS 1.

2.04 PULL AND JUNCTION BOXES

- A. Provide galvanized sheet metal boxes conforming to NEMA OS 1. Provide hinged enclosures for any box larger than 12 inches in any dimension.
- B. Provide cast metal boxes for outdoor and wet locations conforming to NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight with cover and ground flange, neoprene gasket, and stainless steel cover screws.
- C. Provide separate pull boxes and junction boxes for electric power, control, and communication systems.

PART 3 - EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Drawings are approximate unless dimensioned. Verify with A/E the location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Provide access doors where installation is inaccessible. Coordinate locations and sizes of required access doors with those specified in Division 15 - Mechanical.
- D. Locate and install to maintain headroom and to present a neat appearance.

3.02 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6-inch separation, except provide minimum 24-inch separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings. Provide blank plates for all junction boxes.
- D. Securely fasten boxes to the building structure, independent of the conduit, except for splice boxes that are connected to two metal conduits, both supported within 12 inches of box.
- E. Provide access to all boxes.
- F. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- G. Install boxes in walls without damaging wall insulation.
- H. Coordinate with A/E for mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- I. Set boxes installed in concealed locations flush with the finish surfaces, and provide with the proper type extension rings and/or covers where required.
- J. Position outlets to locate luminaires as shown on reflected ceiling plans.
- K. In inaccessible ceiling areas, do not install junction boxes which are accessible only through luminaire ceiling opening.
- L. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use adjustable steel channel fasteners for flush ceiling outlet boxes.

- M. Align wall-mounted outlet boxes for switches, thermostats, and similar devices. Install all grouped device locations neat and symmetrical. Coordinate with A/E before rough-in.

3.03 FLOOR BOX INSTALLATION

- A. Set boxes level and flush with finish flooring material.
- B. Seal as recommended by manufacturer.

3.04 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.
- D. Identify all junction boxes by circuit number on cover with legible permanent ink marker.
- E. Provide weatherproof pull boxes or junction boxes where installed outdoors with watertight gasketed covers fastened by means of corrosion resistant screws.

END OF SECTION 16130

SECTION 16132

CONDUIT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Raceway systems, including:
 - 1. Rigid Galvanized Steel (RGS) conduit and fittings.
 - 2. PVC coated Rigid Galvanized Steel conduit and fittings.
 - 3. Aluminum Rigid Conduit and fittings.
 - 4. Electrical Metallic Tubing (EMT) and fittings.
 - 5. Flexible metal conduit and fittings.
 - 6. Liquid tight flexible metal conduit and fittings.
 - 7. Rigid nonmetallic conduit and fittings.

1.03 RELATED SECTIONS

- A. Section 02581 -Underground Ducts And Manholes
- B. Section 03300 - Cast-in-Place Concrete.
- C. Section 16070 - Supporting Devices.
- D. Section 16120 - Wire and Cable.
- E. Section 16130 - Boxes.

1.04 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
- C. ANSI C80.5 - Rigid Aluminum Conduit.
- D. 2001 CBC - California Building Code (1997 Uniform Building Code with California Amendments)
- E. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code with California Amendments)
- F. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- G. NEMA RN 1 - PVC Externally-Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing.

- H. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- J. UL 1 - Flexible Metal Conduit
- K. UL 6 - Rigid Metal Conduit
- L. UL 360 - Liquid-Tight Flexible Steel Conduit
- M. UL 651 - Schedule 40 and 80 Rigid PVC Conduit

1.05 SPECIAL AREA CLASSIFICATION

- A. Class I, Division 1: Where indicated on the drawings.
- B. Class I, Division 2: Where indicated on the drawings.

1.06 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Rigid Galvanized Steel (RGS) conduit, Electrical Metallic Tubing (EMT) and Fittings:
 - 1. Allied Tube and Conduit Corporation.
 - 2. Western Tube and Conduit
 - 3. Wheatland Tube Co.
- B. Rigid Aluminum Conduit and fittings.
 - 1. Allied Tube and Conduit Corporation.
 - 2. Indalex Aluminum Solutions
 - 3. Wheatland Tube Co.
- C. Flexible Conduit and Fittings:
 - 1. Anamet, Inc.
 - 2. Electri-Flex Co.
 - 3. Eastern Wire and Cable

D. Nonmetallic Conduit and Fittings:

1. Can-Tex Industries.
2. Carlon.
3. Certain-Teed.

2.02 MATERIALS

A. Rigid Galvanized Steel (RGS) Conduit and Fittings:

1. Rigid Steel Conduit and fittings shall be threaded, hot dipped galvanized with zinc coated threads and shall be in compliance with ANSI C80.1, NEMA FB 1, and UL 6.
 - a. Connectors shall have insulated throats.
 - b. Polyvinyl chloride (PVC) externally coated RGS conduit and fittings shall be covered with a 40 mil PVC coating, and shall be in compliance with NEMA RN 1.

B. Rigid Aluminum Conduit and fittings.

1. Rigid Aluminum Conduit and fittings shall be in compliance with ANSI C80.5, UL 6, and NEMA FB 1.
2. Conduit and fittings shall be threaded copper-free aluminum alloy containing not over 0.04% copper.

C. Electrical Metallic Tubing (EMT) and Fittings:

1. Electrical Metallic Tubing shall be hot-dipped galvanized tubing and shall meet the requirements of ANSI C80.3.
2. Fittings shall be set steel screw type and shall meet the requirements of NEMA FB 1.

D. Flexible Metal Conduit (FMC) and Fittings:

1. Flexible metallic conduit shall be of continuously spirally wound galvanized steel or aluminum strip and shall be in compliance with UL 1.
2. Fittings and conduit bodies shall be malleable iron or steel squeeze types and shall be in compliance with NEMA FB 1.
 - a. Connectors shall have insulated throats.

E. Liquid-tight Flexible Conduit (LFMC) and Fittings:

1. Liquid-Tight flexible metallic conduit shall be polyvinyl chloride (PVC) covered continuously spirally wound galvanized steel or aluminum strip with integral grounding conductor and shall be in compliance with UL 360.
2. Fittings and conduit bodies shall be liquid-tight, zinc coated steel and shall be in compliance with NEMA FB 1.
 - a. Connectors shall have insulated throats.

F. Rigid Nonmetallic Conduit (RNC) and Fittings:

1. Rigid nonmetallic conduit shall be schedule 40, polyvinyl chloride (PVC), 90 degrees C rated and shall be in compliance with UL 651, NEMA TC-2, and TC-3.
2. Fittings and conduit bodies shall be in compliance with NEMA TC 3.
3. Conduit, fittings, and cement shall be products of same manufacturer.

G. Miscellaneous Conduit Fittings And Products

1. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.
2. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.
3. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.
4. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75-inch deflection, expansion, or contraction in any direction, and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and stainless steel jacket clamps. Unit shall comply with UL467 and UL514. Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.
5. Fire rated penetration seals:
 - a. UL classified.
 - b. Conduit penetrations in fire rated separation shall be sealed with a UL classified assembly consisting of fill, void or cavity materials.
 - c. The fire rated sealant material shall be the product best suited for each type of penetration, and may be a caulk, putty, composite sheet or wrap/strip.
 - d. Penetrations of rated floors shall be sealed with an assembly having both F and T ratings at least equal to rating of the floor.
6. Penetrations of rated walls shall be sealed with an assembly having an F rating at least equal to the rating of the wall.
7. Hazardous area fittings: UL listed for the application

PART 3 - EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Minimum size of conduit is 3/4-inch. Indicated sizes are minimum based on THW copper wire and larger sizes may be used for convenience of wire pulling.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Conceal conduit in ceiling of all finished areas and in walls of all areas of the building. In unfinished areas without ceilings, conduit may be run exposed overhead. Install all

conduit, including conduit above accessible ceiling, parallel or perpendicular to walls and adjacent piping. Neatly route conduit in a common rack where possible.

- D. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit securely to building structure using clamps, hangers and threaded rod.
- F. Refer to Section 16070 for support of conduit.

3.02 CONDUIT INSTALLATION SCHEDULE

A. Rigid Galvanized Steel Conduit:

- 1. RGS shall be permitted under all conditions subject to the restrictions of the National Electric Code; except areas identified as a corrosive environment.

B. PVC Coated Rigid Galvanized Steel Conduit:

- 1. PVC coated rigid galvanized steel conduit shall be used where exposed in GMP classified aseptic areas (class 100,000 to class 100).
- 2. PVC coated galvanized rigid steel conduit shall be used in the following applications:
 - a. Use 40-mil coating for feeders and branch circuits in damp or wet locations.
 - b. Use 20 or 40 mil for feeders and branch circuits concealed in concrete walls or slabs in contact with earth.
 - c. Use 20 or 40-mil for runs beneath floor slabs on grade.
 - d. Use 40-mil for all below grade penetrations through floor slabs on grade or exterior walls.

C. Rigid Aluminum Conduit:

- 1. Rigid aluminum conduit shall be used in all corrosive environments as identified by owner.

D. Electrical Metallic Tubing:

- 1. EMT shall be permitted for both exposed and concealed work
- 2. EMT shall not be permitted:
 - a. Where subject to physical damage, including mechanical equipment rooms below 8'-0" AFF.
 - b. In corrosive areas
 - c. In cinder block construction
 - d. In hazardous or classified aseptic locations

E. Flexible Metallic Conduit

- 1. Flexible metallic conduit shall be permitted for final connections to, suspended light fixtures, between J-boxes and recessed/surface - mounted light fixtures, to

- overcome building obstructions, for connections to vibrating, hydraulic, or pneumatic equipment, motors, transformers and solenoids in dry locations.
2. Maximum lengths shall be 4'-0" unless otherwise approved by the A/E.

F. Liquid-Tight Flexible Metallic Conduit

1. Liquid-Tight flexible metallic conduit shall be permitted for final connections to vibrating, hydraulic, or pneumatic equipment, motors, transformers, and solenoids in outdoor areas, mechanical areas, and where exposed to moisture.
2. Maximum lengths shall be 4'-0" unless otherwise approved by the A/E

G. Rigid Nonmetallic Conduit.

1. Rigid nonmetallic conduit may be used underground (direct buried or concrete encased).

H. Electrical nonmetallic tubing, flexible polyethylene or PVC tubing will not be acceptable for use on this project. BX and MC cable will not be acceptable for use on this project.

3.03 GENERAL CONDUIT INSTALLATION

- A. Installations shall comply with CEC sections 343, 346, 347, 348, 350 and 351 as required for type of conduit.
- B. Cut conduit square using a saw or pipe cutter; de-burr cut ends before joining.
- C. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- D. Install no more than the equivalent of three 90-degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point. Seal conduit which crosses a boundary between areas of extreme temperature difference.
- G. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- H. Drawings indicate intended circuiting and are not intended to be scaled for exact conduit location.
- I. Install conduit such that it does not interfere with fireproofing of steel.
- J. In all empty conduits or ducts, install a polyethylene pulling rope.
- K. An installation of concealed conduit and recessed outlets and connections shall be provided within all finished areas. Conduits shall be concealed within any areas with suspended ceilings.
- L. Except in electrical and mechanical rooms, conduit connections to motors and surface cabinets shall be concealed unless exposed work is clearly called for on the Drawings.

- M. Install conduits in complete runs before pulling in cables or wires.
- N. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
- O. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.

3.04 PENETRATIONS

- A. Penetrations of walls and wall membranes required to have a fire-resistance rating shall be protected with through-penetration fire stops suitable for the method of penetration. Through-penetration fire stops shall be tested using U.B.C. Standard 7-5. (C.B.C. Sections 709.6, 709.7 & 714).
- B. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, wall, etc.
- C. Cutting or holes:
 - 1. Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed.
 - 2. Provide sleeves or "can outs" for cast-in-place concrete floors and walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack grouting compounds; or fire rated penetration-sealing materials.
 - 3. Cut holes for conduit penetrations through non-concrete and non-masonry walls, partitions, or floors with a hole saw. The hole shall be only as large as required to accommodate the size of the conduit.
 - 4. Provide single piece escutcheon plates around all exposed conduit penetrations in public places.
- D. Sealing:
 - 1. Non-rated penetrations: Pack opening around conduits with non-flammable insulating material and seal with gypsum wallboard taping compound.
 - 2. Fire stop: Where conduits, wireways, and other electrical raceways pass through fire rated partitions, walls, smoke partitions, or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.
- E. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Division 7.
 - 1. Install specified watertight conduit entrance seals at all below grade wall and floor penetrations. Conduits penetrating exterior building walls and building floor slab shall be PVC coated rigid galvanized steel.
 - 2. For roof penetrations furnish and install roof flashing, counter flashing and pitch-pockets as specified under Roofing and Sheet Metal Sections of the Specifications.
 - 3. Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane.

4. Conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration on the exterior side a minimum of two times the conduit diameters.

3.05 CONCEALED IN CONCRETE

- A. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.
- B. Installation of conduit in structural concrete that is less than three inches thick is prohibited. Topping slabs, maintenance pads, and curbs are exempted.
- C. Tie conduits to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Run conduit larger than 1-inch trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.
- D. Where nonmetallic conduit or tubing is used, raceways must be converted to PVC coated rigid steel conduit before rising above floor.
- E. Make couplings and connections watertight.
- F. Protect stub-ups from damage where conduits rise from floor slabs.
- G. Arrange so curved portion of bends is not visible above the finished slab.
- H. Do not install aluminum conduit embedded in or in contact with concrete.
- I. Provide schedule 40 non-metallic sleeve through concrete or masonry walls where aluminum conduit penetrations are required.

3.06 TERMINATIONS AND JOINTS

- A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.
- B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
- C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
- D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
- E. Stub-up connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel

conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this contract, install screwdriver operated threaded flush plugs with floor.

- F. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets or gutters inside the building. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
- G. Raceway seal: Inject into wire filled raceways, a pre-formulated rigid 2 lbs. density polyurethane foam which expands a minimum 35 times it's original bulk. Foam shall have the physical properties of water vapor transmission of 1.2 to 3.0 perms; water absorption less than 2% by volume, fungus and bacterial resistant. Foam shall permanent seal against water, moisture, insects, and rodents. Install raceway sealing foam at the following points:
 - 1. Where conduits pass from warm locations to cold locations to prevent passage of water vapor (such as refrigerated spaces, constant temperature rooms, air-conditioned spaces, etc.).
 - 2. Where conduits enter buildings from below grade.
 - 3. Where conduits enter or leave animal rooms, or research labs.
- H. Install expansion couplings where any conduit crosses a building separation or expansion joint as follows:
 - 1. Conduits three inches and larger, shall be rigidly secured to the building structure on opposite sides of a building expansion joint, and provided with expansion or deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
 - 2. Conduits smaller than three inches shall be rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a copper green ground-bonding jumper installed. For concrete embedded conduit, use expansion and deflection couplings as specified above for three inches and larger conduits.
 - 3. Use short length (maximum of 6ft) of the appropriate FMC or LFMC conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquidtight flexible metal conduit for installation in exterior locations, moisture or humidity-laden atmosphere, corrosive atmosphere, water hose or spray wash-down operations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with FMC or LFMC conduit.

3.07 HAZARDOUS LOCATIONS

- A. Use rigid steel conduit only.

3.08 NONMETALLIC CONDUIT INSTALLATION

- A. Wipe nonmetallic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

3.09 METALLIC CONDUIT INSTALLATION

- A. Make joints mechanically tight and all conduits electrically continuous.
- B. Use conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations. Use sealing locknuts and other approved techniques for moisture proofing raceway in wet areas.
- C. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.
- D. Install expansion joints where conduit crosses building expansion joints and at 150 foot intervals in straight runs.

END OF SECTION 16132

SECTION 16133

WIREWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code with California Amendments)

1.03 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. B-Line.
- B. General Electric.
- C. Hoffman.
- D. Keystone.
- E. Square D.
- F. Wiremold

2.02 MATERIALS

- A. General Purpose Wireway: Square D Square Duct, Series LD.
- B. Oiltight, Dust-Tight Wireway: Square D Type JIC, Series LL.
- C. Raintight Wireway: Square D lay-in raintight, Series LDR.
- D. Raintight Troughs: Square D, Series RD.

- E. Wireway End Closures, Supports and Associated Fittings: Square D, of best forms and dimensions for applications.
- F. Multi-channel Surface metal raceway: Wiremold ALA4800.
 - 1. The aluminum surface metal raceway system specified herein for branch circuit wiring and/or data network, voice, video, and other low-voltage wiring shall be the ALA4800 System as manufactured by The Wiremold Company.
 - 2. The raceway and all system components must be UL Listed in full compliance with their standard for surface metal raceways and fittings (UL-5). All extrusions are to be 6063-T5 aluminum alloy, with nominal wall thickness of 0.078" throughout. The surface finish is to be satin, anodized #204 Type clear, Class R1 Mil-Spec with minimum anodized finish of 0.004" .
 - 3. The raceway shall be a two-piece design with a base and snap-on cover. The base shall be furnished in 10'-0" lengths and the cover sections shall be furnished in 5'-0" lengths. The overall dimensions of assembled raceway shall be 6" wide by 2.25" deep with a cross sectional area of 8.5 square inches.
 - 4. The ALA4800B-10 base shall have an extruded divider separating the 6" raceway into two equal compartments.
 - 5. The ALAC-5 cover shall fit onto both compartments to allow access to only one compartment at a time.
 - 6. The two compartment and separate covers must be available to handle both power and communications wiring.
 - 7. A full compliment of fittings for the raceway shall be available. The available fittings should include, but not be limited to the following: flat, internal and external elbows, tee and cross fittings, wire clips, couplings for joining sections of raceway, grounding adapters as an NEC approved secondary grounding method, and transition connectors to 1/2" and 3/4" trade size conduit.
 - 8. The fittings shall have a satin anodized finish to match the raceway.
 - 9. Device cover plates for mounting the following commercially available devices must be available: duplex devices, single 1.40" and 1.59" dia. receptacles, GFCI, Sentrex[®] surge receptacles and other rectangular faced devices and modular voice and data jacks. All devices must be mounted to the cover plates, which are securely held in place by extruded protrusions. Cover plates are to be removable by use of a standard screwdriver without marring the extrusion finish.
 - 10. The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP, STP (150 ohm), Fiber Optic, Coaxial and other cabling types with faceplates and bezels to facilitate mounting.
 - 11. A complete line of preprinted station and port identification labels, snap-in icon buttons as well as write-on station identification labels shall be available.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide systems of wireway of sufficient size where shown, on equipment racks, and at other locations with two or more starters, disconnect switches, and cabinets mounted in close proximity.
- B. Size wireway cross-sectional area and length based upon conductor fill and equipment served as required by CEC and local codes.
- C. Install types based on environmental conditions to which exposed.

- D. Provide covers for wiring gutters of the same construction as the wiring gutter. Secure cover with captive type screws located in accordance with manufacturer's recommendation. Hinged covers will not be acceptable.

3.02 PAINTING

- A. In finished spaces where wireway is visible, provide prime coat after wireway installation is complete. Refer to Section 09912 - Paints for finish painting.

END OF SECTION 16133

SECTION 16140
WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Specification grade wiring devices, including:
 - 1. Wall switches.
 - 2. Wall dimmers.
 - 3. Receptacles.
 - 4. Floor mounted service fittings.
 - 5. Occupant sensors.
 - 6. Device plates and box covers.

1.03 RELATED SECTIONS

- A. Section 16130 - Boxes.

1.04 REFERENCES

- A. NEMA WD 2 - Semiconductor Dimmers for Incandescent Lamps.
- B. California Energy Code, Title 24, Part 6

1.05 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Switches and Receptacles:
 - 1. Hubbell, Bryant.
 - 2. Leviton.

B. Industrial heavy duty and hazardous area switches and control stations:

1. Hubbell.
2. Appleton.
3. Crouse Hinds

C. Dimmers:

1. Leviton.
2. Lutron.

D. Cover Plates: Match device manufacturer.

E. Floor Mounted Service Fittings:

1. Hubbell, Bryant.
2. RCI.
3. Square D.
4. Walker.

F. Occupant Sensors:

1. Hubbell, Bryant.
2. Leviton.
3. Pass & Seymour.
4. Lighting Control and Design Inc.

2.02 DEVICE COLOR

- A. Provide gray colored switches, dimmers, and receptacles in all areas except where not available for Industrial heavy duty special receptacles, or where NEMA 3R, NEMA 4 or NEMA 12 rating is required.
- B. NEMA 4 and NEMA 12 switches will be self-finished metallic.
- C. Provide orange receptacles for circuits with an isolated ground.

2.03 SWITCHES

- A. Snap Switches: Heavy-duty, quiet type, 20A, 120-277V.
- B. Provide Leviton "Commercial grade" or equal.

2.04 DIMMERS

- A. NEMA WD 2; slide type, solid-state, positive off, Lutron "Nova" series.
- B. 1,500-watt minimum rating; larger size as necessary to accommodate load shown on contract drawings. Fully rated, gangable without breaking off cooling fins.
- C. Rated for incandescent or fluorescent as shown.

2.05 RECEPTACLES

- A. Provide receptacle style NEMA 5-20R, Leviton "Commercial grade" Catalog number range "CR20" or equal, unless noted otherwise, in simplex, duplex, double duplex configuration as indicated on the drawings.
- B. Provide NEMA straight blade, locking style, pin and sleeve or specialty straight blade as indicated on the drawings.
- C. Provide receptacle style NEMA 5-20R with integral GFCI protection, Leviton "Commercial grade" catalog number range "6599" or equal, unless noted otherwise, in duplex configuration with black TEST and red RESET switches. Compliant with UL 943 CLASS A and UL 498.
- D. Provide receptacle style NEMA 5-20R with isolated ground, Leviton "Industrial grade" catalog number range "8300-IG" or equal, unless noted otherwise, in duplex configuration.

2.06 OCCUPANT SENSORS

- A. Device and coverplate finishes and colors to match receptacles and switches within the same area.
- B. Self-Contained:
 - 1. Single gang, gangable device designed to fit behind a standard decorator switch plate.
 - 2. Infrared detector behind a fresnel lens.
 - 3. Detection Range:
 - a. 1,000 square foot field of view.
 - b. 180-degree sensing field.
 - c. 40-foot sensing distance.
 - 4. Adjustable Time-Out Delay: 30 seconds to 30 minutes.
 - 5. Adjustable Ambient Override: 4 footcandles to full daylight.
 - 6. Product: Leviton "ODS15-ID" and "ODS0D-ID"
 - 7. Certified by California Energy Commission
- C. Network:
 - 1. Sensor:
 - a. Self-mounting, ceiling bracket.
 - b. Infrared detector behind a fresnel lens.
 - c. Detection Range:
 - 1) 8 to 14 micrometer frequency spectrum of bodily emitted infrared radiation.
 - 2) 110-degree sensing field over 400 gross square feet.
 - d. Time-Out Delay: 30 seconds to 30 minutes.
 - e. Product: Leviton, "6778".

2. Control Unit:
 - a. Rated 120 volts or 277 volts.
 - b. Enclosure: Galvanized, heavy duty for mounting to a 4-inch or 4-11/16 inch square box.
 - c. Control up to five sensors.
 - d. Power Rating:
 - 1) 2,400 watts incandescent at 120 volts.
 - 2) 2,400 watts fluorescent at 120 volts.
 - 3) 4,800 watts fluorescent at 277 volts.
 - e. Product: Leviton, "6779".
3. Auxiliary Relays for Additional Load:
 - a. 120 Volt: Leviton, "6783-120".
4. Certified by California Energy Commission.

2.07 FLOOR MOUNTED SERVICE FITTINGS

A. Poke-Thru Devices

1. Poke-thru device shall have been examined and tested by Underwriters Laboratories Inc. to Standard UL514A and/or UL514C and bear the U.S. UL Listing Mark. The poke-thru device shall also have been tested by Underwriters Laboratories Inc. and Classified for fire resistance and bear the U.S. UL Classification Mark. Devices shall be classified for use in 1-, 1 1/2-, or 2-hour rated, unprotected reinforced concrete floors and 1-, 1 1/2-, or 2-hour rated floors employing unprotected steel floor units and concrete toppings (D900 Series Designs) or concrete floors with suspended ceilings (fire resistive designs with suspended ceilings should have provisions for accessibility in the ceiling below the poke-thru fittings. This device shall also conform to the standards set in the National Electric Code, Section 300-21. These devices meet all UL scrub water requirements, but are not suitable for wet or damp locations, or other areas subject to saturation with water or other liquids such as commercial kitchens. This poke-thru device shall also have been evaluated by UL to meet the applicable U.S. safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors. Suitable for use in air handling spaces in accordance with Sec 300-22 (C) of the National Electrical Code.
2. The poke-thru devices shall be Walker RC7 devices manufactured by The Wiremold Company. The poke-thru device shall be compatible to accept a complete line of Ortronics[®] workstation connectivity outlets and modular inserts, or the Pass & Seymour Network Wiring System.
3. This assembly consists of an insert and an activation cover. Overall poke-thru assembly length shall be 16 1/4".
4. The insert body shall have the necessary channels to provide complete separation of power and communication services. There shall be one 3/4" trade size channel for power and two 1/2" trade size channels for communication cabling. The channels shall be arranged such that communication cables can be conduit protected and connected to the insert body using a die-cast zinc conduit connector with two 1/2" trade size threaded openings to accept both rigid and flexible conduit connections.

5. The body will consist of an intumescent fire stop material to maintain the fire rating of the floor slab. The intumescent material will be held securely in place in the insert body and shall not have to be adjusted to maintain fire rating of the unit and the floor slab. The insert shall have a spring steel-retaining ring that will hold the poke-thru device in the floor slab without additional fasteners. The poke-thru insert shall also consist of a 3/4" trade size conduit stub that is connected to the insert body and a 24.5 cu. in. stamped steel junction box for wire splices and connections. The stamped steel junction box shall also contain the necessary means to electrically ground the poke-thru device to the system ground.
6. The trim flange shall be manufactured of die-cast aluminum alloy and be capable of being powder-coated or plated. Coated finish is to be textured, two-stage epoxy paint in gray, black, or ivory (to be selected by A/E). A gasket shall be attached to the underside of the trim flange to maintain scrub water tightness. Trim flange shall also be available in a solid brass forging and a die cast brushed aluminum finish. Brass and aluminum finish shall be a brushed finish with a lacquer sealant. Final finish to be selected by the A/E). The activation cover shall be 7" in diameter. The activation slide cover shall be 5" in diameter. The activation shall also be supplied with a 20 amp duplex receptacle prewired with three #12 AWG THHN conductors for power applications. The power receptacle shall be capable of being wired as a standard receptacle or for isolated ground.
7. The poke-thru activation cover shall be manufactured from textured Polycarbonate or PVC, final color to be selected by the architect. The slide holder assembly shall be flush with the floor and provide "Dead-front" protection that allows the receptacle covers to snap back into place when receptacle is not in use. A gasket is attached to the underside of the cover assembly to maintain scrub water tightness by preventing water, dirt, and debris from entering the power and communication compartments. The device shall also have accommodations for up to two communication connectors. The cover shall have individual slides that allow access to the communication connectors and will close over the connectors when not in use. Each activation cover shall also provide locations to adhere labels to identify both power and communication circuits.
8. The activation shall have two locations to mount communication connectors. Connectors shall be mounted using a mounting bracket. Mounting brackets shall be provided to mount up to two Ortronics TracJack Category 6 insert modules or Pass & Seymour Category 6 discrete keystone connectors. Type of communication activation to be verified with the A/E prior to product submittal). Communication connectors shall be installed flush. The unit shall also be supplied with two dual Category 5e keystone connectors and two Lucent keystone connectors with the Pass & Seymour version. The unit shall also accommodate a mechanism to permit protection of communication cabling. This mechanism shall be zinc die-cast with two openings to accept both flexible and rigid conduit. Openings shall accept 1/2" trade size conduit.

B. Flush Floor Fittings (On Grade):

1. Duplex Receptacle:
 - a. 20A, 125V, 2P3W, NEMA 5-20R: "5362", Hubbell.
 - b. Brass cover with flaps: "S-3925", Hubbell.
 - c. 4-inch square, fully adjustable box with round ring: "B-2529", Hubbell.
2. Data Outlet:
 - a. Brass cover with 1-inch and 2-1/8 inch plugs: "S-2725", Hubbell.

- b. 4-inch round, fully adjustable box with round ring: "B-2529", Hubbell.
- C. Flush Floor Fittings (Above Grade):
 - 1. Combination Duplex/Data Outlet:
 - a. Aluminum carpet flange and thermoplastic lift cover with poke-through assembly and junction box.
 - b. Flange and Cover Color: White.
 - c. Product: "PT7-F", Hubbell.

2.08 COVER PLATES

- A. Provide one piece cover plates for all group mounted devices.
- B. Provide stainless steel metal plates for all areas except where not available for Industrial heavy duty special receptacles, or where NEMA 4 or NEMA 12 rating is required.
- C. Duplex receptacles on emergency circuit shall be provided with the word "Emergency" in red color engraved on the plate and with wires inside the box tagged with panel and circuit numbers.
- D. Weatherproof Cover Plate: Gasketed self-closing hinged While-In-Use cover.
- E. Exposed Box Cover Plate: Stamped steel box covers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install receptacles and switches only in electrical boxes which are clean and free from excess building materials, debris, etc.
- B. Install wall switches with OFF position down.
- C. Where switches and other devices are mounted at one location, provide single coverplate to cover all devices. Where switches are located with dimmers, switches shall match dimmers.
- D. Align the tops of all group mounted devices. Install plumb and aligned in the plane of the wall.
- E. Derate ganged dimmers as instructed by manufacturer; do not use common neutral.
- F. Install convenience receptacles in vertical position with grounding pole on bottom unless otherwise noted.
- G. Provide ground fault circuit interrupting type devices in all locations requiring weatherproof devices.
- H. Do not use feed through feature for ground fault interrupting devices. Install GFI device at each location. GFI circuit breaker will not be acceptable.

- I. Install plates on all devices and blank outlets in finished areas. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlets in unfinished areas.
- K. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings.
- L. Mounting Heights:
 - 1. Refer to drawing sheet or contact A/E.
 - 2. Convenience Receptacles Above Counter or Backsplash: 6 inches above counter or backsplash in horizontal position.
 - 3. Receptacles for Water Coolers: Mount directly behind water cooler to eliminate visibility of cord and attachment plug. Coordinate elevation with the cooler to be installed prior to installation of box.
 - 4. Install devices in mill work as shown in details and elevations or as directed by A/E.
- M. Drill opening for poke-through fitting installation in accordance with manufacturer's instructions.
- N. Network Occupant Sensors:
 - 1. Coordinate the sensors and the control units for compatibility. Provide auxiliary relays as necessary.
 - 2. Verify the sensor coverage of the approved manufacturer and provide the necessary sensors, control units and auxiliary relays required to adequately cover and control the indicated area. Where corridors are covered, install ceiling mounted back-to-back sensors.

3.02 FIELD QUALITY CONTROL

- A. Electrical testing:
 - 1. Test proper polarity of all receptacles.
 - 2. Test ground continuity of all wiring devices.
 - 3. Test ground fault interrupting device operation.
- B. Visual and mechanical inspection:
 - 1. Check proper operation of all switches.
 - 2. Visually inspect and replace damaged or defective devices.

3.03 CLEANING

- A. Clean interior of all boxes from dirt and paint prior to installation of devices.
 - 1. Clean wiring devices and coverplates from dirt and paint over spray.

END OF SECTION 16140

SECTION 16150

WIRE CONNECTIONS AND DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Splicing and terminating devices.

1.03 RELATED SECTIONS

- A. Section 16120 - Wire and Cable.

1.04 SUBMITTALS

- A. Furnish samples upon request of Architect/Engineer.
- B. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- C. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Burndy Corp.
- B. Dossert Manufacturing Corp.
- C. Ideal Industries, Inc.
- D. IlSCO Corp.
- E. Minnesota Mining and Manufacturing Co.
- F. Thomas & Betts Co., Inc.

2.02 MATERIALS

- A. Joints, taps, and splices of wire #10 and smaller shall be made by means of "Ideal-Nut" connectors or "3M Scotlok" spring connectors which are resistant to vibration.
- B. Cable and wire connections for splicing or terminating wires #8 and larger shall be made with compression deforming type connectors with heat or cold shrink jacket.

Connectors for cable sizes 250 kcmil and larger shall be the long barrel type for double indentation. Soldered connections will not be permitted.

- C. Provide terminal connectors with hole sizes and spacing in accordance with NEMA standards. Provide terminal connectors with two holes in tongue for use on conductor sizes 250 kcmil and larger. Terminal connectors will not be required for connections to the circuit breakers in the lighting and/or receptacle panels.
- D. Provide connections made with non-insulated connectors insulated with three layers of plastic tape, each layer being half-lapped.
- E. Provide connectors/ lugs as required for oversized feeders.
- F. Taps and splices of wire within in-grade handholes grade shall be made by means of Burndy Type YC-C compression connectors. Each joint, tap and splice in conductor of #8 and larger shall have the connector voids filled with electrical insulation putty and be taped with rubber covered with plastic tape providing insulation not less than one and a half times the thickness of the original insulation with two half-lapped layers each, Scotch #33.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Connectors shall be large enough to enclose and securely fasten all strands of the conductor.
- B. Each joint, tap and splice in conductor of #8 and larger shall have the connector voids filled with electrical insulation putty and be taped with rubber covered with plastic tape providing insulation not less than two half-lapped layers each, "Scotch #33", "Scotch #88", "Slipnot Grey", or equal.
- C. Provide electrical connections to equipment furnished under other contracts and furnish wiring, conduit, outlet boxes, and safety switches, as required. Verify locations, horsepower, and voltages of equipment prior to installation of feeders. If apparent conflict arises in power wiring, advise A/E immediately for clarification.
- D. Provide switches as required by national or local codes.
- E. If the motor is integral to the equipment, isolate the entire piece of equipment with a short section of flexible metal conduit to prevent vibration and/or noise amplification to be transferred to the building structure.
- F. If the motor is adjustable, install an additional length of flexible metal conduit at the motor.
- G. Connect a ground wire from the conduit termination to the motor frame on the inside of flexible conduit. Use approved grounding lugs or clamps or the conduit connection.
- H. Major equipment furnished under mechanical and other sections of specifications may require different rough-in requirements than those indicated on Drawings. Secure detailed drawings from source furnishing equipment to determine actual rough-in locations, conduit and conductor requirements to assure proper installation.

- I. Before connecting any piece of equipment, verify the name plate data corresponds with information shown on Drawings. Discrepancies shall be called to attention of A/E.
- J. Change any feeders installed incorrectly as a result of not verifying equipment requirements, of equipment provided by others, prior to feeder installation.

END OF SECTION 16150

SECTION 16210

SERVICE ENTRANCE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Electrical service entrance, including:
 - 1. Arrangement with power company for permanent electric service.
 - 2. Secondary service entrance from power company.
- B. Scope Of Work: It is the intent of this specification to secure electrical service to the facility. The general requirements of the electrical utility company are indicated on the drawings. Coordinate work with the Utility Company based on Construction Schedule.

1.03 RELATED SECTIONS

- A. Section 02581 – Underground Ducts and Manholes
- B. Section 16060 - Grounding and Bonding Systems.
- C. Section 16132 - Conduit.
- D. Section 16441 - Switchboards.

1.04 SYSTEM DESCRIPTION

- A. System Voltage: 480/277 volts, three-phase, four-wire, 60 hertz.
- B. Service Entrance: Underground.

1.05 SUBMITTALS

- A. Submit product data.
- B. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around where equipment, pipe and ducts are prohibited. Show equipment layout and relationships between electrical components and adjacent structural and mechanical elements.
- C. Provide submittals of all junction boxes, concrete pads, grounding systems, secondary service entrance conduits, service entrance conductors, service entrance switchboard, service entrance panelboards, terminations and meter sockets.
- D. Submit product data as required by Pacific Gas and Electric (PG&E) for review and approval.

- E. Submit documentation indicating products and materials have been approved by PG&E and meet PG&E standards.

1.06 QUALITY ASSURANCE

- A. Install service entrance in accordance with power company's rules and regulations.
- B. Install primary and secondary distribution raceway system, trenching and concrete structures and service entrance in accordance with utility company's rules and regulations.
- C. Verify all requirements indicated on the drawings and in the specifications with the utility company during pre-construction meetings.

PART 2 - PRODUCTS

2.01 UTILITY

- A. Utility company: Pacific Gas & Electric (PG&E).

2.02 EQUIPMENT

- A. Coordinate with the utility company and provide equipment and conduits in accordance with utility company directives. All equipment and materials shall be pre-approved for use by PG&E.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The contractor shall contact, schedule meetings and make arrangements with the utility company (PG&E) to obtain permanent electric service to the project based on construction schedule requirements. The Contractor shall hold a pre-construction meeting with the utility company to establish the schedule requirements of the project. The Contractor shall agree with the utility company the frequency and notice period required for utility company inspections of installations provided by the Contractor. The Contractor shall confirm trenching requirements, conduit routing, transformer pad, junction box locations, sizes and appurtenances with the utility company prior to providing submittals on products.
- B. Provide submittals of all junction boxes, concrete pads, grounding systems, secondary service entrance conduits, service entrance conductors, service entrance switchboard, service entrance load centers, bus terminations and meter socket for review and approval by Utility Company.
- C. The Utility Company (PG&E) will be responsible for providing primary service entrance conduits, trenching and backfilling from utility company terminations. Final conduit connections into existing live power manholes will be provided by PG&E with trenching provided by the Contractor.
- D. Provide continuous length of 1/4" polypropylene pull rope in all spare conduits.

- E. Utility Company will provide primary cables and connect conductors to service transformer.
- F. The Utility Company will be responsible for providing pad-mounted service transformer.
- G. Provide grading and site preparation for Utility Company transformer pad.
- H. Provide concrete pad with conduit windows for Utility Company transformer. Pad may be cast in place or pre-cast subject to approval by the Utility Company.
- I. The Contractor shall be responsible for providing transformer grounding as indicated on the drawings. Provide two ground rods installed a minimum of 6'-0" apart. Rods shall be interconnected by a continuous #2 AWG bare copper stranded conductor.
- J. Provide secondary service entrance conduits from the Utility Company transformer secondary to the building service entrance equipment.
- K. Provide secondary conductors between utility transformer secondary vault and service entrance equipment. Identify conductors and seal.
- L. Provide all trenching for primary and secondary raceways.
- M. Coordinate location and spacing of all utilities to be installed in joint utility trenches with owners of each utility service and obtain required inspections and approvals.

END OF SECTION 16210

SECTION 16231

ENGINE GENERATOR

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Standby generator system.
- B. Scope Of Work: It is the intent of this specification to secure a standby generator system that has been prototype tested, factory built, production tested, site tested, of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein. The equipment supplied and installed shall meet the requirements of the local Monterey Bay Unified Air Pollution Control District, NFPA, the California Electric Code and all applicable local codes and regulations. All equipment shall be new, of current production by a national firm which manufactures the generator and controls, transfer switch, and assembles the standby generator sets as a matched unit so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

1.03 RELATED SECTIONS

- A. Section 16070 - Supporting Devices.
- B. Section 16071 - Seismic Controls For Electrical Installations
- C. Section 16075 - Electrical Identification.
- D. Section 16080 - Electrical Testing.
- E. Section 16120 - Wire and Cable.
- F. Section 16132 - Conduit

1.04 SUBMITTAL

- A. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around where equipment, pipe and ducts are prohibited. Show generator layout and relationships between electrical components and adjacent roadways, paths, fences, architectural and structural and mechanical elements. Show support locations, type of support, and weight on each support.
- B. Submittal shall include specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications. Identical package

shall be submitted to the local Air Pollution Control District for approval.

- C. Submittal shall include details of concrete housekeeping pad, minimum concrete base anchorage and seismic support structure requirements.
- D. Provide submittal drawings and calculations signed and sealed by licensed Structural engineer to A/E for approval for access stairs and platforms.
- E. Provide submittal drawings and calculations signed and sealed by licensed Structural engineer to A/E for approval for concrete housekeeping pad.
- F. Indicate on submittal location or area served and equipment identification tag for each generator and automatic transfer switch.
- G. Wiring diagrams including a system diagram distinguishing between factory wiring and field wiring.

1.05 TESTING

- A. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer shall be responsible for design prototype tests as described herein: Components of the emergency system, such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and reliability preproduction models, which will not be sold, shall be used for these tests. Upon request, the following certified test records shall be made available:
 - 1. Maximum power (kw).
 - 2. Maximum starting (kva) at 30 percent instantaneous voltage dip.
 - 3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
 - 4. Governor speed regulation under steady-state and transient conditions.
 - 5. Voltage regulation and generator transient response.
 - 6. Fuel consumption at no load, 1/4, 1/2, 3/4, and full load.
 - 7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
 - 8. Three-phase line-to-line short circuit test.
 - 9. Alternator cooling air flow
 - 10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
 - 11. Endurance testing.

1.06 WARRANTY

- A. In addition to the Guarantee of Work required under the General Conditions, the emergency generator system shall be warranted by the manufacturer for five years from the date of substantial completion.

1.07 PROJECT CONDITIONS

- A. Project Seismic Zone and Zone Factor as Defined in UBC: Zone 4. Occupancy Category as Defined in UBC: 1 Essential Facility.
- B. Generator shall be installed above grade, exposed to weather as indicated on the drawings.
- C. Ambient Temperature: Minus 15 to plus 40 deg C.

- D. Relative Humidity: 0 to 95 percent.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The standby generator set shall be by Caterpillar, Kohler or acceptable equal, rated continuous standby (defined as continuous for the duration of any power outage) 277/480 volts, 3 phase, 4 wire, .8 powerfactor, 85 degrees Fahrenheit. Vibration isolators shall be provided between the engine-generator and welded steel base. Entire unit shall be housed in a weatherproof sound attenuating enclosure on a 6-inch high concrete base with permanent metal access stair and platform with hand rail to access the maintenance service doors.
- B. Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:
 - 1. Single-step load pickup.
 - 2. Transient and steady-state governing.
 - 3. Safety shutdown device testing.
 - 4. Voltage regulation.
 - 5. Rated Power.
 - 6. Maximum Power.
 - 7. Sequencing Elevator Release and Single Cab Operation.
- C. Upon request, arrangements to witness this test will be made or a certified test record will be sent prior to shipment.

2.02 ENGINE

- A. The engine shall deliver the required HP at a governed speed of 1,800 rpm. The engine shall be equipped with the following:
 - 1. Fuel filters and electric solenoid fuel shut-off valve.
 - 2. Positive engagement solenoid shift-starting motor.
 - 3. Automatic solid state battery charging alternator with solid-state voltage regulation.
 - 4. Electronic governor with electric actuator capable of regulating no load to full load frequency to a 5 percent maximum and capable of 0.66 percent steady state frequency regulation.
 - 5. Computerized air fuel ratio controller and catalytic converter when required to meet Monterey Bay Unified Air Pollution Control District requirement.
 - 6. Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
 - 7. Dry-type replaceable air cleaner elements.
- B. The turbocharged engine shall be fueled with diesel, 4-cycle, and liquid cooled. The radiator blower fan, water pump, thermostat and radiator duct flange shall properly cool the engine with up to 0.5 inches water static pressure on the fan.

2.03 GENERATOR

- A. The alternator shall be 4-pole, self-ventilated of drip-proof construction with

amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard for Class F and be vacuum impregnated with epoxy varnish to be fungus resistant. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within plus-or-minus 2 percent at any constant load from 0 to 100 percent of rating. The regulator must be protected from the environment by conformal coating.

- B. On application of any load up to the rated load, the instantaneous voltage dip shall not exceed 20 percent and shall recover to plus-or-minus 2 percent of rated voltage within one second.
- C. A resettable line current sensing circuit breaker with inverse time versus current response shall be furnished and shall not automatically reset preventing restoration of voltage if maintenance is being performed. This breaker shall protect the generator from damage due to its own high current capability and shall not trip within the 10 seconds specified above to allow selective tripping of down-stream fuses or circuit breakers under a fault condition.
 - 1. Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.
 - 2. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - 3. Trip Settings: Matched to generator thermal damage curve as closely as possible.
 - 4. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 5. Mounting: Adjacent to or integrated with control and monitoring panel.
- D. The generator, having a single maintenance free bearing, shall be directly connected to the flywheel housing with a semiflexible coupling between the rotor and the flywheel.

2.04 GENERATOR CONTROLLER

- A. Set-mounted controller capable of facing right, left, or rear shall be vibration isolated on the generator enclosure. The microprocessor control board shall be conformal coated. Relays will only be acceptable in high current circuits.
- B. Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include:
 - 1. Fused DC circuits.
 - 2. Complete two-wire start/stop control which shall operate on closure of a remote contact.
 - 3. Speed sensing and a second independent starter motor disengagement systems shall protect against the starter engaging with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.
 - 4. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then reengage the starter.
 - 5. Cranking cyler with ten-second ON and OFF cranking periods.
 - 6. Overcrank protection designed to open the cranking circuit after 60 seconds if the engine fails to start.
 - 7. Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure, or overspeed are received.
 - 8. Engine cool down timer factory set at five minutes to permit unloaded running of the standby set after transfer of the load to normal.

9. Three-position (Automatic - OFF - TEST) selector switch. IN the test position, the engine shall start and run regardless of the position of the remote starting contacts. In the automatic position, the engine shall start when contacts in the remote control circuit close and stop five minutes after those contacts open. In the off position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an emergency. Reset of any fault lamp shall also be accomplished by putting the switch to the off position.
 10. "Lockout" contact for generator lockout by emergency power off (EPO).
- C. A 16 light engine and generator instrument panel shall be installed on the unit with vibration isolators, the control panel shall have provisions to be rotated 90 degrees facing left, right or the back of the generator set and include the following:
1. Indicator lamps and alarm contacts:
 - a. "Not in auto" (flashing red)
 - b. Overcrank (red)
 - c. Emergency stop (red)
 - d. High engine temperature (red)
 - e. Overspeed (red)
 - f. Low oil pressure (red)
 - g. High battery voltage (red)
 - h. Low battery voltage (red)
 - i. System ready (green)
 - j. Anticipatory low oil pressure (yellow)
 - k. Battery carrier fault (green)
 - l. Low fuel (red)
 - m. Low water temperature (yellow)
 - n. Anticipatory high water temperature (yellow)
 2. Instrument
 - a. Dual range voltmeter plus-or-minus 2 percent accuracy.
 - b. Dual range ammeter plus-or-minus 2 percent accuracy.
 - c. Lights to indicate high or low meter scale.
 - d. Direct reading pointer-type frequency meter plus-or-minus 5 percent accuracy, 45 to 65 Hz scale.
 - e. Panel illuminating lights.
 - f. Battery charging meter.
 - g. Oil pressure gauge.
 - h. Running time meter
 - i. Voltage adjust rheostat
 - j. Engine water temperature
 - k. D.C. voltmeter
 3. Controls
 - a. Lamp test switch
 - b. Voltage adjusting rheostat +/- 5% range
 - c. Panel lamp (2)
 - d. Voltmeter-ammeter phase selector switch
 4. Alarm horn, with silence switch, to meet the requirements of NFPA 110. Note:

Silencing this horn after one fault, i.e., low fuel, shall not prevent it from sounding again should a different condition occur.

- D. Complete control panel shall be "rodent proof" to prevent damage to components by small rodents.

2.05 FUEL STORAGE SYSTEM SUB-BASE TANK

- A. Provide a U.L. listed dual wall sub-base mounted fuel storage tank with a minimum capacity to support the generator at full load for minimum 32 hours. Tank design shall provide stub up area for electrical conduit from below. Secondary containment to UL 142 shall be provided.
- B. Tank features shall include:
 - 1. 2" filler spout.
 - 2. Engine supply and return openings and drain tubes.
 - 3. Vent for both primary and secondary containment.
 - 4. Fuel level indicator gauge.
 - 5. Low fuel level alarm switch, set at 2 remaining hours.
 - 6. Secondary containment, totally enclosed with double wall tank construction.
 - 7. Provide leak detection alarm contact in secondary tank.
- C. Provide flexible fuel lines rated for duty at 300 degrees F and 100 PSI.
- D. Overfill protection/warning shall be provided. Including Audible/visual signal for overfill, auto shut-off at 95%, delivery slow down 30 min prior to overfilling to 15 gpm.

2.06 EXHAUST SYSTEM

- A. Exhaust Muffler: Provide a Commercial Muffler, including flexible exhaust fitting, properly sized and installed according to the manufacturer's recommendation. Mounting shall be provided by the installer. The muffler shall be mounted so that its weight is not supported by the engine. Exhaust pipe size shall be sufficient to ensure that exhaust backpressure does not exceed the maximum limitations specified by the generator set manufacturer.
- B. Insulation: The muffler and all indoor exhaust piping shall be lagged by the installer to maintain a surface temperature not to exceed 150 degrees F. The insulation shall be installed so that it does not interfere with the functioning of the flexible exhaust fitting.

2.07 COOLING SYSTEM

- A. A radiator with heat-exchange expansion tank shall be provided with all necessary piping for proper cooling of the engine running at 100 percent load @ 55 degrees C.

2.08 AUTOMATIC STARTING SYSTEM

- A. Starting Motor: A DC electric starting system with positive engagement drive shall be furnished. The motor voltage shall be as recommended by the engine manufacturer.
- B. Automatic Controls: Fully automatic generator set start-stop controls in the generator control panel shall be provided. Controls shall provide shutdown for low oil pressure,

high water temperature, overspeed, overcrank, and one auxiliary contact for activating accessory items. Controls shall include a 30-second, single-cranking cycle limit with lockout.

- C. Jacket Water Heater: A unit-mounted thermal circulation-type water heater(s) incorporating a thermostatic switch shall be furnished to maintain engine jacket water to 90 degrees F in ambient temperature of 30 degrees F.

2.09 BATTERY

- A. A lead/acid storage battery set of the heavy-duty diesel starting type shall be provided. Battery voltage shall be compatible with the starting system. The battery set shall be capable of delivering the minimum cold-cranking amps required at zero degrees Fahrenheit per SAE Standard J-537 and of sufficient capacity to provide for 1 1/2 minutes total cranking time without recharging. A battery rack and necessary cables and clamps shall be provided.

2.10 BATTERY CHARGER

- A. A solid state regulated battery charger shall be furnished to automatically recharge batteries. It shall include overload protection, silicon diode-full wave rectifiers, voltage surge suppressors, DC ammeter, and fused AC input. AC input voltage shall be 120V. Amperage output shall be no less than 10 amperes.

2.11 AUTOMATIC TRANSFER SWITCH

- A. Type: Automatic transfer switches, 3-phase, 60 Hz, and 3 poles with switched neutral, for voltage specified herein and for the current rating indicated on the drawings shall be provided. Each switch shall conform with the provisions of Underwriters' laboratory 1008 Standards for Automatic Transfer Switches.
- B. Accessories: The transfer switch shall be equipped with the following accessories:
 1. Time Delay - Nominal 0.5 to 7.5 seconds on signal to start.
 2. Time Delay - Nominal 0.5 to 7.5 seconds on transfer to emergency.
 3. Time Delay - Adjustable 2 to 25 minutes on re-transfer with 5 minutes unloaded running time.
 4. Voltage and frequency lockout relay.
 5. Differential protection, 3-phase, dropout at 70 percent and pickup at 90 percent voltage.
 6. Test switch.
 7. Engine starting contact.
 8. Two auxiliary contacts - close on emergency, close on normal.
 9. Three sets auxiliary contacts (3 N/O and 3 N/C).
 10. Generator Exerciser.

2.12 ACCESSORIES

- A. Overvoltage protection will shut down the unit after one second of 15 percent or more overvoltage.
- B. Two flexible fuel lines.
- C. "SNMP" Communications Module capable of communicating all status and alarms.

2.13 WEATHER/SOUND PROTECTIVE ENCLOSURE

- A. Provide a steel 14 to 16 gauge weather and Level 2 sound protective enclosure with removable or hinged side panels to allow inspection and maintenance. The enclosure shall be coated with ASA gray primer and two coats of high-gloss, weather-proof, and resistant vinylac in the bonding process. Color shall be to manufacturers standard colors.
- B. Doors shall have a common keyed latch. Provide 2 sets of keys.
- C. Enclosure shall be louvered as required to ensure proper air flow.
- D. Vertical up-flow outlet hood with 90 degree angle to redirect air.
- E. Acoustic insulation meeting UL94 HF1 flame resistance standards.
- F. Doors shall be located in the enclosure so that service points are directly accessible.
- G. Interior Lights: With switch. Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external circuit supply.
- H. Generators that are mounted where the service door opening is greater than 30" above surrounding finished grade shall have platforms installed with handrails and steps that facilitate maintenance and servicing of the generator. Materials of construction shall be hot dipped galvanized steel, stainless steel or aluminum. Service platforms shall be a minimum of 48" wide.

2.14 REMOTE ANNUNCIATOR

- A. Provide and install a recessed 16 light remote alarm/status panel as shown on the drawings. Panel shall include the following features:
 - 1. Alarm indicators for:
 - a. Pre-alarm high engine temperature
 - b. Pre-alarm low oil pressure
 - c. Low water temperature
 - d. Low fuel
 - e. Battery charger fault
 - f. Low battery voltage
 - g. Auxiliary fault
 - 2. Shutdown indicators for:
 - a. High engine temperature
 - b. Low oil pressure
 - c. Emergency stop
 - d. Overspeed
 - e. Overcrank
 - 3. Status indicator for:
 - a. Line power

- b. Generator power
 - c. System ready
 - d. Lamp test switch
4. Alarm horn, with "Silence/Normal" Switch.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENT

- A. The equipment shall be generally installed as shown on the plans, in accordance with the manufacturer's recommendations and all applicable codes.
- B. Refer to section 16080 for additional testing requirements.
- C. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.
- D. Coordinate size and location of conduit stub-up locations and wiring connections.
- E. Location and dimensions of generator set with fuel tank and acoustic enclosure shown on the plans are indicative and may vary by manufacturer. Contractor shall coordinate placement of generator enclosure with surrounding equipment and structures. Contractor shall submit a dimensioned layout drawing for the generator enclosure in relation to surrounding equipment and structures, in addition to submittal requirements indicated within the project specifications. Service stub-up locations are indicative and final locations and requirements shall be coordinated with the approved generator set submittal shop drawings.

3.02 INSTALLATION

- A. Convene a pre-installation meeting one week prior to commencing work of this section.
- B. Install in locations shown on Drawings, in accordance with manufacturer's written instructions and maintaining clearances in accordance with applicable codes..
- C. Tighten accessible connections and mechanical fasteners after placing equipment.
- D. Provide a 6-inch concrete housekeeping pad with anchor bolts. Bolt equipment to pad plumb and square.

3.03 FIELD QUALITY CONTROL

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure insulation resistance of each feeder conductor phase-to-phase and phase-to-ground for one minute each.
- C. Check tightness of accessible joints using a calibrated torque wrench in accordance with manufacturer's recommended values.
- D. Provide on-site testing of the system under load prior to final acceptance. Perform infrared testing of installation during the test. Remake any connection showing abnormally high temperature variations.

3.04 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to return to "as new" condition.
- C. Adjust trip and time delay settings to values shown on Drawings or as required.

3.05 SITE TEST

- A. An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The A/E, regular operators, and the maintenance staff shall be notified of the time and date of the site test. Provide fuel and load bank for all site tests. All tests shall be recorded. The tests shall include:
 - 1. Fuel, lubricating oil, and antifreeze (liquid cooled models) shall be checked for conformity to the manufacturer's recommendations under the environmental conditions present and expected.
 - 2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. This shall include: engine heaters, battery charger, generator strip heaters, remote annunciator, etc.
 - 3. Start-up under test mode to check for exhaust leaks, path of exhaust gases, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.
 - 4. Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper systems coordination. Engine temperature, oil pressure and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test.
- B. Refer to Specification Section 16080: Electrical Testing.
- C. Test sound level at points north, south, east and west from engine. Test sound level at 20 linear feet, 40 linear feet and 60 linear feet from engine. Record data in accordance with section 16080.

3.06 PERMIT

- A. Provide a framed copy of Monterey Bay Unified Air Pollution Control District permit located near the generator.

3.07 AUXILIARY CIRCUITS

- A. Provide 120 V and 208V AC circuits to generator auxiliaries as required to operate the generator.
- B. Provide conduit and cable as required between remote annunciator and controller as shown on plans.
- C. Provide spare conduit only from generator stubbed up adjacent to automatic transfer switch in electrical room for future installation of cabling to "SNMP" communications module.

3.08 DEMONSTRATION

- A. Engage a factory-authorized service representative to train the Owner's maintenance

personnel to adjust, operate, and maintain packaged engine generators and transfer switches.

- B. Coordinate this training with that for transfer switches.
- C. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
- D. Review data in maintenance manuals.
- E. Review data in maintenance manuals.
- F. Schedule training with Owner, with at least seven days' advance notice.
- G. Minimum Instruction Period: Eight hours.

END OF SECTION 16231

SECTION 16276

DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Dry-type two-winding, isolation, non-linear transformers.

1.03 RELATED SECTIONS

- A. Section 16075 - Electrical Identification.

1.04 REFERENCES

- A. IEEE C57.12.91 - Dry-Type Distribution and Power Transformers.
- B. NEMA ST 20 - Dry-Type Transformers for General Applications.
- C. UL 1561 - Dry-Type General Purpose and Power Transformers.

1.05 SUBMITTALS

- A. Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, no load core loss, full load winding conductor loss, full load losses, efficiency at 25 percent, 50 percent, 75 percent and 100 percent rated loads, percent regulation with 80 percent and 100 percent power factor loads, sound level, tap configurations, insulation system type and rated temperature rise.
- B. Submit proposed mounting and support details for wall mounted and ceiling hung transformers.
- C. Indicate K-factor where applicable.
- D. Base data for electrical characteristics on actual laboratory tests of typical transformers.
- E. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
- F. Provide operation and maintenance manual.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

- B. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Dry-Type Two-Winding Transformers:

- 1. Cutler-Hammer.
- 2. General Electric.
- 3. Hevi-Duty.
- 4. Sorgel.
- 5. Square D.

B. Dry-Type Non-Linear Transformers:

- 1. General Electric.
- 2. Hevi-Duty.
- 3. Topaz/Square D.

2.02 DRY-TYPE TWO-WINDING TRANSFORMERS

- A. Factory-assembled, air cooled dry type transformers; ratings as scheduled; capable of operating at 100 percent load continuously at an ambient temperature of 40 degrees C.
- B. Insulation system and average winding temperature rise for rated kVA as follows:

kVA Rating	Insulation Class	Temperature Rise degrees C
1-15	185	115
16-500	220	150

2.03 DRY-TYPE NON-LINEAR TRANSFORMERS

- A. Factory assembled, air cooled, dry-type, shielded isolation transformers; ratings as scheduled; capable of operating at 100 percent load continuously at an ambient temperature of 40 degrees C.
- B. Insulation system and average winding temperatures rise for rated kVA as follows:
 - 1. kVA Rating: 15 to 300.
 - 2. Insulation Class: 220.
 - 3. Temperature Rise degrees C: 150.
- C. Provide electrostatic winding shield with separate insulated grounding connection.
- D. Provide neutral sized for 200 percent of secondary phase conductors.
- E. Manufactured and tested in accordance with IEEE C57.12.91, UL 1561, and NEMA ST 20 at K factor rating of 13.

2.04 GENERAL

- A. Enclosures: Unless indicated otherwise, provide general purpose, NEMA 1 for indoor locations; and weatherproof, NEMA 3R for outdoor locations.
- B. Provide NEMA TP-1 Energy Star labeled transformers.
- C. A. Maximum Case Temperature: 50 degrees C rise above ambient at its warmest point.
- D. Winding Taps, Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
- E. Winding Taps, Transformers 15 kVA and Larger: Two 2-1/2 percent below and two 2-1/2 percent above rated voltage, full capacity taps on primary winding.
- F. Sound Levels: Maximum noise level as follows:

kVA Rating	Noise Level Decibels
0 - 9	40
10 - 50	45
51 - 150	50
151 - 300	55

- G. Basic Impulse Level: 10 kV for transformers less than 300 kVA; 30 kV for transformers 300 kVA and larger.
- H. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- I. Mounting: Provide transformers 112.5 kVA and below suitable for wall, floor or trapeze mounting; transformers larger than 112.5kVA suitable for floor mounting.
- J. Coil Conductors: Continuous copper windings with terminations welded or brazed to ends of the windings.
- K. Core: High grade, non-aging silicon steel with high magnetic permeability.
- L. Isolate core and coil from enclosure using vibration absorbing mounts.
- M. Nameplate: Include transformer connection data.
- N. Impedance: Transformer impedance shall conform to NEMA standards.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Set transformer plumb and level. Mount enclosure on vibration isolators to minimize noise transmission from the enclosure to supporting structure. Set floor mounted transformers at 10-degree angle to wall on a neoprene pad on housekeeping pads.

- B. Install transformer so that enclosure does not make contact with wall surface.
- C. Provide steel channel support structure for wall mounted equipment.
- D. Provide floor and wall mounted steel channel support structure for transformers that are stacked vertically.
- E. Use flexible conduit indoors in dry locations or liquidtight flexible conduit in damp/wet locations, two-foot minimum in length, for primary and secondary connections to transformer case. Make connections to side panels of enclosure, except for floor mounted transformers fed from directly below enclosure.
- F. Ground neutral connection to service ground per codes.
- G. Provide all transformers with lugs for both primary and secondary conductor sizes for conductors shown on Drawing. Connect lug to termination point with appropriate size bolt, nut flat and Belleville washers.
- H. Provide high-pressure compression lugs, for primary and secondary phase and neutral terminations for transformers 45 KVA and larger. Utilize only the tool and dies designed for uses in installing the lugs provided.

3.02 FIELD QUALITY CONTROL

- A. Check for damage and tight connections prior to energizing transformer.
- B. Measure primary and secondary voltages and make appropriate tap adjustments.
- C. Prior to energizing of transformer the contractor shall thoroughly clean the interior of enclosure of all construction debris, scrap wire, etc. using manufacturer's approved methods and materials.
- D. Upon completion of project prior to final acceptance the contractor shall thoroughly clean both the interior and exterior of transformer per manufacturers recommended materials and methods. Remove paint splatters and other spots, dirt, and debris.
- E. Touch-up paint any marks, blemishes, or other finish damage suffered during installation.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments. Adjust primary taps so that secondary voltage is above and within 2 percent of rated voltage.

END OF SECTION 16276

SECTION 16336

TRANSIENT VOLTAGE SURGE SUPPRESSORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Transient voltage surge suppressors (TVSS).
- B. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.03 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified.
 - 1. American National Standards Institute, Inc. (ANSI)/Institute of Electrical and Electronics Engineers (IEEE):
 - a. ANSI/IEEE C62.1; Standard for Surge Arresters for Alternating Current Power Circuits.
 - b. ANSI/IEEE C62.11; Standard for MOV Surge Arrestors in Low-Voltage AC Power Circuits.
 - c. ANSI/IEEE C62.41; IEEE Recommended Practice for Surge Voltages in Low Voltage AC Power Circuits.
 - d. ANSI/IEEE C62.45; Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.
 - 2. Underwriters Laboratory, Inc. (UL):
 - a. UL 50; Cabinets and Boxes.
 - b. UL 1283; EMI/RFI Facility Filters.
 - c. UL 1449; Standard for Transient Voltage Surge Suppressor.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. NEMA LS1; Low Voltage Surge Protective Devices.
 - b. NEMA PB1.1; Instructions for Safety Instruction Operation and Maintenance of Panelboards Rated 600 Volts or less.

1.04 SYSTEM DESCRIPTION

- A. All specification noted herein apply to both the panelboard and switchboard units

unless otherwise noted.

B. The TVSS shall be a parallel design transient voltage surge suppression system. The system shall utilize diversion modules to suppress and divert transient voltage and surge currents. The system shall be designed to provide protection for sensitive electronic devices against the effects of surges, transients and electrical line noise.

C. Environmental requirements:

1. Operating temperature: -40c to 60c.
2. Relative humidity: 0 - 95%.
3. Operating altitude: 0 - 12,000 feet.
4. Audible noise: Less than 35 dB.

D. Electrical requirements:

1. The TVSS shall have unlimited nominal current handling when installed in a parallel configuration.
2. The TVSS system voltage shall be as shown on the Drawings.
3. Protection modes: For a WYE configured system; the device shall have directly connected suppression elements between line-to-neutral (L-N), line-to-ground (L-G), and neutral-to-ground (N-G). For a Delta configured system, the device shall have suppression elements between line-to-line (L-L) and line-to-ground (L-G).
4. Each unit's mode of operation shall protect against surges and transients from line-to-ground and line-to-line or line-to-ground, line-to-neutral, and neutral-to-ground if a neutral wire is present.
5. The TVSS shall be a hybrid device capable of suppressing the following amperage per mode:
 - a. Main switchboard 100,000 amps minimum.
 - b. 120/208-volt branch panelboards: 50,000 amps minimum.

E. Operating parameters:

1. The maximum response time shall not exceed 1 nanosecond.
2. Electrical noise filter: Each unit shall include a high performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be no less than 55 dB at 100 kHz.
3. The TVSS system shall operate over a frequency range of 47 hertz to 63 hertz.
4. The TVSS system shall limit total harmonic distortion produced to less than one percent.
5. The system's filtering mode shall provide sine wave tracking to within +/-20 percent.
6. The maximum surge voltage rating for devices must not exceed the following:

MODES	120/208V	277/480V	347/600V
WYE: L-N; L-G; N-G	400V	800V	1200V
Delta: L-L; L-G	800V	1500V	2000V

7. The let through voltage for Category C3 surges (20 kV, 10 kA) shall be less than:

MODES	120/208V	277/480V	347/600V
L-N	500V	900V	1300V

8. The let through voltage for Category B3 surges (6 kV, 500 amps) shall be less than:

<u>MODES</u>	<u>120/208V</u>	<u>277/480V</u>	<u>347/600V</u>
L-N	170V	300V	470V

9. All devices shall be tested to the specified surge voltage ratings to ensure the devices achieve the required life expectancy and reliability. Testing to full ratings also verifies internal construction quality of the suppressors.

1.05 SUBMITTALS

- A. Submit in accordance with the requirements of Section 16010: Basic Electrical Requirements, the following items:
1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 2. Describe system operation, equipment, and dimensions and indicate features of each component.
 3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 4. Shop drawings: Include elevations, cabinet dimensions, complete component listing and layout within cabinet, amperage ratings and capacities, system characteristics, and wiring diagrams.
 5. Submit manufacturer's installation instructions.
 6. Complete bill of material listing all components.
 7. Warranty.

1.06 OPERATION AND MAINTENANCE MANUAL

- A. Supply operation and maintenance manuals in accordance with the requirements of Section 16010: Basic Electrical Requirements, to include the following.
1. A detailed explanation of the operation of the system.
 2. Instruments for routine maintenance.
 3. Pictorial parts list and parts number.
 4. Telephone numbers for authorized parts and service distributors.

1.07 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.
- B. Only products and applications listed in this Section may be used on the project unless

otherwise submitted.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: TVSS components shall not be delivered to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable.
- B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic. Provide heat where required to prevent condensation.
- C. Handling: Handle in accordance with the manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to manufacturer.

1.09 WARRANTY

- A. Units and components offered under this Section shall be covered by a 5 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
 - 1. Current Technology.
 - 2. EFI Electronics.
 - 3. Clipper Power System (Cutler-Hammer).
 - 4. Liebert.
 - 5. General Electric.
 - 6. Or equal.
- B. Substitutions: Under provisions of Section 16010: Basic Electrical Requirements.

2.02 PROTECTION AND FILTERING ELEMENTS

- A. The TVSS system shall consist of protection modules designed to suppress and divert transient voltage and surge currents. Each protection module shall be rated to suppress the per phase surge current, as noted above, for the application. Each protection module shall contain multiple individually fused metal oxide varistor(s) capable of withstanding over 1000 surges of current rated at 10,000 amperes and 20,000 volts per ANSI C62.41-1991, Category C with less than 10% degradation.
- B. The protection for the switchboard units shall be of the plug-in type for ease in installation and/or replacement. No special tools should be required to replace the module. Modules in the panelboard units do not have to be the plug-in type.
- C. The line-to-neutral mode shall contain filtering elements capable of providing noise

attenuation as specified above.

2.03 ENCLOSURES

- A. Switchboards : A NEMA 1 or 12 enclosure shall be designed for mounting totally within the switchboard enclosure. The switchboard manufacturer shall provide a separate section dedicated and compartmentalized from all power bus bars. The units shall be completely installed in the switchboard factory.
- B. Panelboard units mounted internally:
 - 1. Unit shall have minimal conflict with branch circuit wiring and conduit terminations. The unit shall be mounted in the bottom of the panelboard where the majority of branch circuits exit from the top of the panel. Conversely, units shall be mounted on the top of the panelboard where the majority of branch circuits exit from the bottom of the panel. Coordinate with the Construction Drawings.
 - 2. Viewing of the unit's monitoring/status indicator lights shall be possible without opening the panelboard. This may be accomplished by providing remote cover mounted indicating lights or by a cutout in the outer door metal cover directly over the indicating lights. The cutout shall be as small as possible and not void any U.L. or NEC ratings or requirements. It is advisable that the unit be factory installed in the panelboard. Provide black engraved nameplate, with white letters, denoting the purpose and meaning of the indicating lights directly over the lights.
 - 3. Access to the units mounted inside panelboards shall be via the same standard one piece, door-in-door trim, using the outer door.

2.04 OVERCURRENT PROTECTION

- A. Switchboards : The units shall be provided with a minimum 60 ampere switching duty rated, non-fused safety disconnect switch or circuit breaker. The phase conductors from the power source shall be terminated at the disconnect switch or circuit breaker line terminals. The neutral (where available), and ground conductor shall be terminated at line terminals in the unit and all subsequent phase wiring internal to the system shall be factory wired. The front cabinet door shall be mechanically interlocked requiring the power to the system be interrupted in order to gain access to current carrying parts.
- B. Panelboards: The units provided for branch panelboards shall be a direct bus connection. Each unit shall contain it's own internal overcurrent protection.
- C. All internal devices shall be fused in such a manner as to prevent violent failures or propelling of particles under any failure condition up to the full AIC rating listed for the associated switchboard or panelboard. Main power fuses do not meet this requirement.

2.05 MONITORING FEATURES

- A. Switchboard : Provide the following features:
 - 1. Each protection module shall contain a pulsing green light and solid red light for easy viewing. The normal operation of the protection module shall provide positive indication utilizing the pulsing green light. Failure of the protection module shall provide negative indication utilizing the solid red light. Indication

of module failure shall be duplicated remotely on the outside front door of the switchboard enclosure providing a summary visual alarm utilizing the pulsing green and solid red lights.

2. An audible local alarm shall sound in the event a protection module has failed. Pushing an alarm silence button can silence the audible alarm.
3. TVSS counter capable of counting individual transient events as they occur. The counter consists of a six-digit readout calibrated to count all relevant surges. The counter shall be provided battery back up capable of storing the number of events in memory when input power is not available.
4. The status/surge counter, indicator panel and audible alarm shall be remote to the front of the switchboard .
5. Provide auxiliary form-C dry contacts for remote monitoring of status.

B. Panelboards: Provide the following features:

1. Each unit shall contain a pulsing green light and solid red light for easy viewing. The normal operation of the protection module shall provide positive indication utilizing the pulsing green light. Failure of the protection module shall provide negative indication utilizing the solid red light.
2. Auxiliary form-C dry contacts for remote monitoring of status.

2.06 SOURCE QUALITY CONTROL

- A. System shall be thoroughly factory-tested before shipment. Testing of each system shall include but shall not be limited to "HI-POT" tests at two times rated voltage plus 1000 volts per UL listing, ANSI C62.41, Category B surge test, UL ground leakage tests, and operational and calibration tests.
- B. Provide factory test report to verify the operational integrity of each unit's suppression system.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of TVSS installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 INSTALLATION

- A. Install TVSS in accordance with manufacturer's written instructions, as shown on the drawings and as specified herein.
- B. Set cabinets plumb and symmetrical with building lines in conformance with PB1.2. Furnish and install all construction channel bolts, angles, etc., required to mount the equipment furnished under this Section.
- C. Conductors from the power source to the surge suppressor shall be #4 AWG copper in switchboards and #8 AWG copper in panelboards. Conductors shall be routed without sharp bends and straight and short as possible. The absolute maximum of 7'-0" long for units in switchboards and 1'-0" long for units in panelboards.

- D. Switchboards: Conductors originating from direct bus bar connections shall be individually wrapped with electric tape in half-lapped increments for added protection of the un-protected conductors. Tie-wrap the conductors away from the bus bars without any sharp bends. All holes that the conductors pass through shall be grommets.
- E. Cabinets shall be anchored and braced to withstand seismic forces as calculated per Section 16010: Basic Electrical Requirements.
- F. Provide TVSS protection for electrical equipment where indicated on the drawings. Refer to power one line diagram(s).

3.03 FIELD QUALITY CONTROL

- A. Prefunctional testing:
 - 1. Visual and mechanical inspection:
 - a. Inspect for physical damage, defects, alignment and fit.
 - b. Compare nameplate information and connections to contract documents.
 - c. Check tightness of all control and power connections.

END OF SECTION 16336

SECTION 16411
DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Disconnect switches, including:
 - 1. Fuses.
 - 2. Enclosures.

1.03 RELATED SECTIONS

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.

1.04 REFERENCES

- A. 2001 CEC - California Electrical Code (NFPA 70 - National Electrical Code with California Amendments)
- B. UL 198E - Class R Fuses.

1.05 SUBMITTALS

- A. Furnish dimensions and ratings for voltage, ampacity, horsepower and short circuit.
- B. Indicate enclosure material finish and NEMA classification type.
- C. Furnish samples upon request of Architect/Engineer.
- D. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- E. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Disconnect Switches:
 - 1. Cutler-Hammer.

2. General Electric.
3. Siemens.
4. Square D.

B. Fuses:

1. Bussman.
2. Gould-Shawmut.
3. Littelfuse.

2.02 ENCLOSURE DESIGN REQUIREMENTS

- A. Provide disconnect switches of the type suitable for the application and environment.
- B. Provide NEMA 1 (general purpose) enclosure for interior use unless noted otherwise.
- C. Provide NEMA 12 (industrial) enclosure for interior use in repair garage, welding and associated storage areas, maintenance, production areas and where shown on Drawings or required by the interior environment.
- D. Provide NEMA 3R (water resistant) enclosure for exterior use unless noted otherwise.
- E. Provide NEMA 4 enclosure where indicated on the drawings.

2.03 DISCONNECT SWITCHES

- A. Fusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class J.
- B. Nonfusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. General-Use Snap Switch: Motors of one horsepower or less as allowed by code.
- D. Construct all current carrying parts of high conductivity copper with silver-plated switch contacts.
- E. Provide solid copper neutral bar where a neutral is present in the circuit.

2.04 FUSES

- A. Fuses 600 Amperes and Less: UL 198E, Class J; as indicated on drawings; time delay, dual element, current limiting, 600 volt.
- B. Fuses Over 600 Amperes: Class L, bolt-on type with time delay and capability to hold 500 percent rated fuse current for a minimum of four seconds and clear 20 times rated fuse current in .01-second or less. Provide fuses with 'O' ring seals between end bells and glass melamine barrel similar to Bussman time delay KRP-C.
- C. Interrupting Rating: 200,000 rms symmetrical amperes.

- D. Provide all fuses of the same manufacturer.
- E. Install fuses in motor circuits in accordance with motor manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide disconnect switches, where required by NEC, where indicated on drawings, and where required by equipment manufacturer, in a location convenient for maintenance on each switch and adjacent equipment.
- B. Provide fused disconnect switches when required to maintain equipment manufacturer's warranty. Coordinate with Division 15 for warranty requirements of equipment approved by submittal.
- C. Install fuses in fusible disconnect switches. Provide permanent marking inside switch enclosure for fuse type.
- D. Wall mount switches, where possible, or mount on Uni-Strut supports.
- E. Provide spare fuse cabinet in main electrical room complete with three spare fuses for each rating installed for fuse sizes over 600 amperes, and ten percent spare fuses (minimum of three) of each type and rating installed for 600 amperes or less.
- F. Provide fuse identification label showing type and size inside door of each switch.
- G. Mount with operating handle at 5'-6" above finished floor. Align the tops of all grouped starters/disconnects. Install plumb and aligned in the plane of the wall in which they are installed.
- H. Provide supports of galvanized angle or other suitable material where mounting on wall or other rigid surface is impractical. Do not support from conduit alone. Locate disconnects that are mounted on equipment served so that the disconnect will not inhibit the removal of any service panel or interfere with required access.
- I. Mount in accessible location to allow sufficient room for maintenance on itself and adjacent items.
- J. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- K. Check tightness of accessible bolted bus joints using a calibrated torque wrench in accordance with manufacturer's recommended values.
- L. Identify with arc flash data based on recommendations of Section 16053 Electrical System Coordination Study.

3.02 FIELD QUALITY CONTROL

- A. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections.

- B. Provide on-site testing of the system under load prior to final acceptance. Perform infrared testing of installation during the test. Remake any connection showing abnormally high temperature variations.

3.03 TESTING

- A. Refer to Specification Section 16080: Electrical Testing.

3.04 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to return to "as new" condition.
- C. Provide fuses based on recommendations of Section 16053 Electrical System Coordination Study.

END OF SECTION 16411

SECTION 16423

CONTACTORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 RELATED SECTIONS

- A. Section 16075 - Electrical Identification.
- B. Section 16080 - Electrical Testing.
- C. Section 16442 - Panelboards.
- D. Section 16510 - Lighting Fixtures - Building.

1.03 SUBMITTALS

- A. Furnish written verification that contactor type is compatible with all controlling devices.
- B. Indicate enclosure material finish and NEMA classification type.
- C. Provide operation and maintenance manual.
- D. Furnish samples upon request of Architect/Engineer.
- E. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- F. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Allen-Bradley.
- B. ASCO.
- C. General Electric.
- D. Square D.

2.02 ELECTRICALLY HELD CONTACTORS

- A. Electrically held for two-wire control.
- B. Encapsulate coils and rate for continuous duty.

2.03 GENERAL

- A. Coil Operating Voltage: 120 volts, 60 hertz.
- B. Contacts: Provide the number of contacts for the control functions indicated plus two additional contacts, field convertible to normally open or normally closed contacts.
- C. Provide solderless pressure wire terminals.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate controlling devices such as time clocks and photocells with contactor furnished for compatible system.
- C. Identify with nameplate. Label each circuit controlled.

END OF SECTION 16423

SECTION 16424

INDIVIDUAL MOTOR STARTERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Starters, contactors, and switches for motor control.
- B. Controller for each motor and piece of equipment where controller is not furnished as an integral part of the equipment and as indicated or specified to provide the Owner a complete and operating system.

1.03 RELATED SECTIONS

- A. Section 15130 - Pumps.
- B. Section 15832 - Axial Fans.
- C. Section 15834 - Centrifugal Fans.
- D. Section 15900 - Controls.
- E. Section 16070 - Supporting Devices.
- F. Section 16075 - Electrical Identification.
- G. Section 16080 - Electrical Testing.

1.04 REFERENCES

- A. IEEE Std. 519 - Harmonic Control in Electric Power Systems.
- B. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC.

1.05 DESIGN REQUIREMENTS

- A. Provide starters of the type suitable for the application and environment.
- B. Provide NEMA 1 (general purpose) enclosure for interior use starters unless noted otherwise.
- C. Provide NEMA 12 (industrial) enclosure for interior and exterior use in repair garage, welding and associated storage areas, maintenance, production areas and where shown on Drawings or required by the interior environment.
- D. Provide NEMA 3R (water resistant) enclosure for exterior use starters unless noted

otherwise.

- E. Provide NEMA 4 enclosure for starters where indicated on the drawings.

1.06 SUBMITTALS

- A. Include data on relays, pilot devices, switching and overcurrent protection. Include trip ratings, size and UL listing.
- B. Indicate enclosure material finish and NEMA classification type.
- C. Provide operation and maintenance manuals for variable frequency motor controllers and motor starters.
- D. Furnish samples upon request of Architect/Engineer.
- E. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- F. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Allen Bradley.
- B. Cutler-Hammer.
- C. General Electric.
- D. Square D.

2.02 MANUAL MOTOR STARTERS

- A. Fractional Horsepower Manual Starter: AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, pilot light, and toggle operator.
- B. Motor Starting Switch: AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, red pilot light, NO auxiliary contact, and toggle operator.

2.03 MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: AC general-purpose, Class A, magnetic controller for induction motors rated in horsepower as indicated.
- B. Provide accessible terminals for wiring directly from the front of the starter.
- C. Contacts: Provide silver, cadmium oxide alloy, double break, non-welding contacts

which will not require filing, dressing or cleaning throughout the life of the control equipment.

- D. In addition to general arrangements indicated on the drawings, each starter shall have the following accessories:
 - 1. One N.O. and one N.C. auxiliary contacts.
 - 2. Heavy-duty oil tight green, push-to-test motor running indicating light.
 - 3. Heavy-duty oil tight H-O-A switch.
- E. Three phase solid-state power monitor for anti-single phasing protection on motors 20 HP and larger. Cutler Hammer SVM3 series, General Electric or equal.
- F. Provide starter types as scheduled:
 - 1. Full Voltage Starting: Non-reversing type.
 - 2. Two Speed Starting: Two speed, two winding, variable torque type. Include integral time delay transition between FAST and SLOW speeds. Must be compatible with motor installed.
- G. Coils: Pressure molded, 120 volts, 60 hertz. Provide integral control transformer.
- H. Overload Relay: Provide bimetal overload relays in all three phases for three-phase full voltage starters, in ungrounded phases for single-phase full voltage starters and in all six legs for two-speed full voltage starters. Provide overload relays of the hand reset, trip-free variety so that blocking the reset mechanism in the reset position will not prevent the motor controller from dropping out if the motor is overloaded. Capability to field convert overload relays from hand to automatic reset is unacceptable.
- I. Auxiliary Contacts: Provide each starter with the required auxiliary contacts for the control functions indicated and required, including the holding interlock and pilot light interlocks plus two additional contacts, field convertible to normally closed or normally open NEMA ICS 2 controls. Provide capability to add auxiliary contacts without removing existing wiring or removing the controller from its enclosure.
- J. Selector Switches: HAND/OFF/AUTO for single-speed motors; HAND/OFF/ AUTO with FAST/SLOW selector switch for two-speed motors; in front cover.
- K. Indicating Lights: RUN; red for single-speed motors; FAST/SLOW; red/amber for two-speed motors (push to test type) in front cover. Operate pilot lights by separate interlock not placed across the holding coil.
- L. Control Power Transformers: Provide integral 120 volt secondary control transformer with both primary and secondary fuses for each controller.

2.04 COMBINATION MOTOR STARTER

- A. Combine magnetic motor starter with disconnect in common enclosure as scheduled with adjustable trip, magnetic-only molded case, motor circuit protector.
- B. Provide combination starters with an IER of at least 100,000A (RMS) when used with feeder protective device indicated.

2.05 VARIABLE FREQUENCY MOTOR CONTROLLERS

A. Manufacturers:

1. Allen-Bradley.
2. Century.
3. Emerson.
4. General Electric.
5. Reliance.
6. Robicon.
7. Square D.
8. York.

B. Provide variable frequency drive (VFD) motor controllers to vary the speed of standard AC induction motor used on fans and/or pumps. Controllers may be VVI or PWM Type if they comply with this specification. Provide isolation bypass contactors on all VFD motor controllers in order to operate the equipment while the VFD is inoperative or being maintained. Conform to IEEE Std. 519.

C. Provide VFD controllers that are specially designed for varying the speed of both standard and high efficiency three-phase, squirrel cage induction motors and capable of momentary overloads of 110 percent.

D. Provide VFD controllers with a continuous current rating of no less than the full load current indicated on the driven motor nameplate. Provide with continuous speed adjustment with corresponding constant volts/hertz excitation.

E. Provide VFD controllers with an AC to DC converter, DC link filter and an inverter section.

1. Provide inverter section with power transistors. SCPs or gate turn-off devices are unacceptable.
2. Factory mount and wire all components on a dead-front, grounded, free-standing or wall mounted minimum NEMA-1 enclosure arranged for top and bottom conduit entry. Provide free-standing enclosure suitable for mounting on a steel platform or on a concrete housekeeping pad, except where VFD controllers are indicated on plan to be installed group mounted or motor control center, provide controller capable of being mounted in motor control centers.
3. Provide front accessible connections and easily removable assemblies. Provide capability to interchange all printed circuit boards in regulator section with other units.

F. Incorporate the following features on the VFD controller:

1. Input Power: 480 volts plus 5 percent, minus 10 percent, 3-phase, 60 hertz.
2. AC input fuses.
3. Input line filters capable of protecting the electronics against transient voltage spikes or notches. Isolation transformers are unacceptable.
4. Output motor contactor rated at the full amperage of the VFD. Interlock this contactor with the bypass magnetic starter to provide a mechanical disconnect from the motor when the VFD is off or at zero speed.
5. Make all control adjustments without the necessity of extender boards on special meters. Provide front access for all adjustable potentiometers.
6. Electrically isolate logic and control circuits from the power circuits. Ground

- signal circuit common point.
 - 7. LEDs for signal tracing and status indication.
 - 8. Independently adjustable acceleration and deceleration potentiometers; 0.5 to 25 seconds.
 - 9. Power dip ride-through to allow continuous operation for up to a three cycle line loss.
 - 10. Local and remote automatic switch.
 - 11. Motor slip dependent speed regulation.
 - 12. Frequency stability of 0.5 percent for 24 hours with voltage regulation of plus 2 percent of rated output.
 - 13. Unidirectional coast to rest upon stop.
 - 14. Before restoration of power after momentary outage or transfer of power, provide ability to pick up and supply power to driven motor at any speed without damage or provide time delay for motor decay.
- G. Limit the harmonic distortion on the incoming 480V bus to 5 percent or less with a source impedance of 1 percent or less.
- H. Provide the VFD with instantaneous overcurrent trip. Maximum allowable current is 160 percent of nameplate current rating under this specification.
- I. Phase sensitive VFDs will not be acceptable.
- J. Provide electronic I²t motor protection. Bimetallic overloads are unacceptable.
- K. Provide the VFD with a full load, full speed efficiency of 95 percent or better.
- L. Provide the VFD with a full function current limit, adjustable from 10 percent to 110 percent which is independent of the instantaneous overcurrent trip, basically works as follows: In the event of a motor overload, current is unable to exceed the adjustable preset limit. When the current reaches that limit, it will hold that level for one minute. If the current is not reduced during the one-minute time interval, the motor speed is automatically reduced until the overcurrent condition is removed. The motor may then return to the required speed after the overcurrent condition is removed.
- M. Provide an integral fault diagnostic center indicating the following conditions:
- 1. External fault.
 - 2. Processor line fault.
 - 3. Low AC line voltage.
 - 4. High AC line voltage.
 - 5. Current overload.
 - 6. High DC bus voltage.
 - 7. VFD output fault.
- N. Provide VFD with convection cooling.
- O. Provide VFD with controlled regenerative override to apply a decelerating torque to motor without tripping off the line when the speed command is reduced.
- P. Protection against:
- 1. Input line over/under voltage.
 - 2. AC line transient voltage.

3. Phase loss.
4. Output ground fault. Prevent the VFD from blowing fuses in this condition. Isolation transformers will not be used to prevent this condition.
5. Output line-to-line short circuit.
6. Motor overload.
7. DC over voltage.
8. Over frequency.
9. Over temperature.
10. Electrical isolation between power and logic circuits.
11. DI/DT and DI/DV for semiconductors.

Q. Provide VFD with 0.5 percent speed regulation.

R. Mount following on door of VFD:

1. Hand-off automatic selector switch with indicator lights.
2. Manual speed potentiometer.
3. Speed meter 0 to 100 percent.
4. Non-fused disconnect switch.

S. Provide the VFD with a three-position HOA switch to accept a 4 to 20 ma signal for the automatic operation as described in Division 15 - Controls and required by the sequence of operation.

T. Specifically select VFD to provide quiet operation with standard motor. Select controller so sound level in spaces adjacent to mechanical room do not exceed a N.C. of 35. After installation, if adjacent spaces do exceed N.C. of 35, replace controller at no additional cost.

U. Provide portable service analyzer, one total for project, capable of being plugged into controller without modification. Portable service analyzer to have capability to run, stop and control unit, and indicate satisfactory operation or isolate the source of malfunction to the smallest replaceable unit.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Select and install heater elements in motor starters to match installed motor characteristics.
- C. Mount with operating handle at 5'-6" above finished floor. Align the tops of all grouped starters. Install plumb and aligned in the plane of the wall in which they are installed.
- D. Provide supports of galvanized angle or other suitable material where mounting motor starters on wall or other rigid surface is impractical. Do not support starters from conduit alone. Locate motor starters that are mounted on equipment served so that the starter will not inhibit the removal of any service panel or interfere with required access.

- E. Mount in accessible location to allow sufficient room for maintenance on itself and adjacent items.
- F. Securely mount all starters indicated.
- G. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- H. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each.
- I. Check tightness of accessible bolted bus joints using a calibrated torque wrench in accordance with manufacturer's recommended values.
- J. Provide spare printed circuit board for each size variable speed drive.
- K. Coordinate with other trades as required for control and interconnections with motors provided under other Divisions.
- L. Identify with arc flash data based on recommendations of Section 16053 Electrical System Coordination Study.

3.02 TESTING

- A. Refer to Specification Section 16080: Electrical Testing.

3.03 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to return to "as new" condition.
- C. Adjust circuit breaker trip settings based on recommendations of Section 16053 Electrical System Coordination Study.
- D. Adjust circuit breaker trip settings for coordination with other overcurrent protective devices in system.
- E. Adjust circuit breaker trip settings for adequate protection from overcurrent and fault currents.

END OF SECTION 16424

SECTION 16441
SWITCHBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Main and distribution switchboards.

1.03 RELATED SECTIONS

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.
- C. Section 16080 - Electrical Testing.
- D. Section 16120 - Wire and Cable.
- E. Section 16132 - Conduit.
- F. Section 16336 - Transient Voltage Surge Suppressors

1.04 REFERENCES

- A. NEMA PB 2 - Dead Front Distribution Switchboards.
- B. NEMA PB 2.1 - General Instruction for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.
- C. UL 891 - Dead-Front Switchboards.

1.05 SUBMITTALS

- A. Utility company metering and termination provisions with indication of approval by utility company.
- B. Indicate detailed dimensions for the front and side views.
- C. Indicate conduit entrance locations and requirements.
- D. Indicate enclosure material finish and NEMA classification type.
- E. Indicate nameplate legends.
- F. Indicate size and number of bus bars and ground; switchboard instrument details.
- G. Furnish instructions for handling and installation of switchboard.

- H. Include electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- I. Provide operation and maintenance manual.
- J. Provide one-line diagram.
- K. Indicate cable terminal sizes and cable lug details.
- L. Provide copy of approved submittals to Utility Company.
- M. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- N. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site with shipping splits and subassemblies sized for passing through openings.
- B. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.07 SPARE PARTS

- A. Keys: Furnish two each to the Owner for each lock.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Cutler-Hammer.
- B. General Electric.
- C. Siemens.
- D. Square D.

2.02 SWITCHBOARD CONSTRUCTION AND RATINGS

- A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB 2, and UL 891, and complete from incoming line terminals to load-side terminations.
- B. Provide Utility pull section compartment as indicated. Underground pull section, terminations and metering compartment to meet requirements of the utility company.

- C. Enclosure for Utility metering section and main distribution. UL listed and labeled for service entrance application.
- D. Provide Utility Metering Compartment where indicated: Fabricated compartment and section meeting utility company's requirements. If separate vertical section is required for utility metering, match and align with basic switchboard.
- E. Switchboard electrical ratings and configurations as shown on Drawings. Integrated equipment rating as shown, but not less than 65,000 amperes RMS (sym).
- F. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and number of conductors used.
- G. Main Section Devices: Individually mounted.
- H. Distribution Section Devices: Panel mounted.
- I. Bus Material: Copper with tin plating, sized in accordance with NEMA PB 2.
- J. Bus Connections: Bolted, accessible from front for maintenance. Provide Belleville washers for and properly torque all connections.
- K. Provide with main lugs and breakers or fuses as scheduled on the drawings. Provide main lug connection to accommodate two-hole long barrel T & B compression connector on end of cable. Attach connector to panel bus with two bolts per lug. Provide captive type bolts or studs to facilitate reinstallation of the lugs with the wire attached.
- L. Provide fully rated copper neutral bus.
- M. Provide front panel mounted TVSS equipment integral to switchboard enclosure.
- N. Provide properly sized copper ground bus through the length of the switchboard.
- O. Enclosure: NEMA PB 2 Type 1. Align sections at front and rear.
- P. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.
- Q. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings. Extend and drill main bus for future addition by means of splice plate.

2.03 SWITCHING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers (1,600 amps or smaller):
 1. Provide bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.
 2. Provide circuit breakers UL listed as Type SWD for lighting circuits.
 3. Provide UL Class A ground fault interrupter circuit breakers where scheduled.

- B. Circuit breakers with trip ratings 401 amps through 1200 amps shall have electronic trips with the following characteristics:
 - 1. Electronic true RMS sensing trip, adjustable via current plug.
 - 2. Adjustable long time setting and delay.
 - 3. Adjustable short time pick-up and delay.
 - 4. Adjustable instantaneous pick-up.
 - 5. Mechanical targets on overload, ground fault, and short circuit.

- C. Circuit breakers with trip ratings 101 amps through 400 amps shall have solid state electronic trips with true RMS reading through the 13th harmonic with 1% accuracy, interchangeable trip via front accessible current plug, adjustable instantaneous and short time be rated as shown on drawings at the voltage indicated.

- D. Circuit breakers with trip ratings 100 amp and smaller shall be ambient temperature compensated, thermal magnetic type unless otherwise noted. Breakers shall be of full size, 1 inch per pole type. Panels with more than one branch breaker larger than 100 amps shall be installed in distribution type panels.

- E. Provide ground fault protection on each main device, rated 480/277 volts, 1,000 amps or larger, and as indicated on the drawings, as follows:
 - 1. UL listed ground sensor relay system, General Electric GSR, with ground break components for each system with coordinated ground sensor (CR) with integral test winding, solid state relay to operate with shunt trip circuit on the switch and monitor panel.
 - 2. Use time delay type relay with the following features:
 - a. Continuously adjustable current pick-up settings of 100 to 1,200 amperes.
 - b. Continuously adjustable time delay setting from instantaneous (0.03 second) to one second.
 - c. Memory function to recognize and initiate tripping on intermittent ground faults.
 - 3. Install panel which indicates relay operation and provides means for testing the system with or without interruption of electrical service and does not permit the ground fault system to be inadvertently left in an inactive or 'off' state.
 - 4. Use ground sensor for zero sequence arrangement on the main service entrance devices.

2.04 INSTRUMENTATION

- A. Provide solid state circuit monitor with digital output display rated for 120 volts, 60 hertz. Cutler Hammer IQ 320.

- B. Provide six-digit LED readout which will allow local display of the following electrical parameters:
 - 1. Voltmeter, phase to phase and phase to neutral.
 - 2. Current, per phase RMS and 3 phase average.
 - 3. Demand current, per phase.
 - 4. Power factor, per phase and 3 phase total.
 - 5. Real power, 3 phase total.
 - 6. Reactive power, 3 phase total.

7. Apparent power, 3 phase total.
8. Energy (MWH).
9. Reactive energy (MVARH).
10. Frequency.
11. Average demand real power.

C. Provide the circuit monitor with the following characteristics:

1. Built-in communications capability which will allow multipoint communication at a 9,600 minimum baud rate to a remote computer workstation, programmable controller or other host device.
2. Adjustable demand interval (5 to 60 minutes).
3. Nonvolatile memory for storing all historical data.

D. Set-up of the monitor shall be accomplished from the front of the device. It shall not be necessary to open the front of the enclosure to reach rear mounted dip-switches. Include set-up parameters for CT ratio, PT ratio, System type 3 or 4 wire, and demand interval.

E. Provide keyswitch protection for all set-up and reset functions to prevent unauthorized/accidental change of value.

F. Provide the following monitor accuracy in percent of full scale for:

1. Current Voltage Measurements: Plus or minus 1 percent.
2. Power and Energy: Plus or minus 2 percent.
3. Frequency: Plus or minus 0.5 percent.
4. Power Factor: Plus or minus 4 percent.
5. Data Update Time: 0.817 S (4 wire).

G. Provide three potential transformers (PT) rated 480/120 volt with metering class accuracy.

H. Provide three current transformers (CT) having a primary to match the size of the bus and a 5 ampere secondary with metering class accuracy.

2.05 TVSS

A. Provide front panel mounted TVSS equipment integral to switchboard enclosure where indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install switchboard in locations shown on Drawings, in accordance with manufacturer's written instructions and NEMA PB 2.1.

B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

C. Provide a 4-inch concrete housekeeping pad with anchor bolts. Bolt equipment to pad plumb and square.

- D. Provide filler plates for unused spaces.
- E. Provide typewritten circuit directory mounted in permanent, clear Lexan card holder located on inside of door or front of switchboard.
- F. Tighten electrical connectors and terminals; including screws and bolts, in accordance with equipment manufacturers published torque-tightening values for equipment connectors. Where manufacturers torque requirements are not indicated tighten connectors and terminals to comply with tightening torque specified in UL Standard 486A.
- G. Install overcurrent protective devices and accessories in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. All devices shall be installed in accordance with applicable NEC and NEMA standards for installation.
- H. Identify with arc flash data based on recommendations of Section 16053 Electrical System Coordination Study.

3.02 FIELD QUALITY CONTROL

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each.
- C. Check tightness of accessible bolted bus joints using a calibrated torque wrench in accordance with manufacturer's recommended values.

3.03 TESTING

- A. Refer to Specification Section 16080: Electrical Testing.

3.04 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to return to "as new" condition.
- C. Adjust circuit breaker trip settings based on recommendations of Section 16053 Electrical System Coordination Study.
- D. Adjust circuit breaker trip settings for coordination with other overcurrent protective devices in system.
- E. Adjust circuit breaker trip settings for adequate protection from overcurrent and fault currents.

END OF SECTION 16441

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Distribution, lighting, and appliance branch circuit panelboards.

1.03 RELATED SECTIONS

- A. Section 16070 - Supporting Devices.
- B. Section 16075 - Electrical Identification.
- C. Section 16423 - Contactors.

1.04 REFERENCES

- A. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.05 SUBMITTALS

- A. Include outline and support point dimensions, NEMA enclosure type, voltage, main bus ampacity and material, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Furnish samples upon request of Architect/Engineer.
- C. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- D. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

1.06 SPARE PARTS

- A. Keys: Furnish two keys to Owner for each panelboard, all keyed alike.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Cutler-Hammer.

- B. General Electric.
- C. Siemens.
- D. Square D.
- E. I.E.M.

2.02 GENERAL

- A. Provide equipment from the same manufacturer throughout the project.
- B. Protective devices and equipment shall be fully rated, not series rated.
- C. Conform to UL standards and bear UL label. Form cabinets from code gage galvanized steel. Form fronts of code gage cold rolled steel bonderized after fabrication.
- D. Provide cabinet fronts with concealed hinges, concealed adjustment means and master keyed flush lock. Finish front in manufacturer's standard gray enamel. Door-within-door style panel.
- E. Provide with main lugs and breakers or fuses as scheduled on the drawings. Provide main lug connection to accommodate two-hole long barrel T & B compression connector on end of cable. Attach connector to panel bus with two bolts per lug. Provide captive type bolts or studs to facilitate reinstallation of the lugs with the wire attached.
- F. Provide all panelboards with copper bus of the ratings scheduled and designed for all indicated devices and spaces, complete with taps and trim.
- G. Provide panelboards, designated with "NL" on Drawings, UL listed for nonlinear loads, bearing UL label, and neutral bar rated at 200 percent of phase buses.
- H. Minimum short circuit rating 22,000 amps RMS symmetrical for 240 volt panelboards.
- I. Size bus bars to limit the temperature rise within the panelboard to 50 degrees C over a 40 degrees C ambient temperature.
- J. Provide adequate space and provisions for wire No. 6 AWG and larger conductors to terminate with compression type connector to main lugs.
- K. Connect all two-section panelboards with copper cable of an ampacity greater than the main bus ampacity.
- L. Circuit breakers serving Fire Alarm Control Panel(s) shall be red in color.
- M. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings.
- N. Provide panelboard enclosures of the type suitable for the application and environment.

- O. Provide NEMA 1 (general purpose) enclosure for interior use unless noted otherwise.
- P. Provide NEMA 12 (industrial) enclosure for interior use in repair garage, welding and associated storage areas, maintenance, production areas and where shown on Drawings or required by the interior environment.
- Q. Provide NEMA 3R (water resistant) enclosure for exterior use unless noted otherwise.
- R. Provide NEMA 4 enclosure where indicated on the drawings.

2.03 DISTRIBUTION PANELBOARDS (1,200 AMPS AND SMALLER)

- A. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- B. Provide plated copper grounding bus.
- C. Provide full height bussing to accommodate addition of future circuit breakers.

2.04 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.
- B. Provide insulated neutral bus and separate copper grounding bus bonded to enclosure.
- C. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- D. Provide ground fault equipment protection circuit breakers for all circuits serving heat trace equipment.
- E. Sequence phase all adjacent breakers. All circuit breaker connection straps shall be rated at 100 amperes minimum.
- F. Provide full height bussing to accommodate addition of future circuit breakers.

2.05 MOLDED CASE CIRCUIT BREAKERS

- A. Individually mounted and panelboard mounted, branch and feeder circuit breakers shall be molded case, bolt on and trip indicating.
- B. Where stationary molded case circuit breakers are shown on the drawings to be current limiting type, they shall be current limiting as defined by UL 489 and shall not employ any fusible elements.
- C. Circuit breakers shall have interrupting capacity not less than that shown on the drawings, or if not shown, not less than 25,000 RMS symmetrical amps for 480 volt systems and 22,000 RMS symmetrical amps for 208 volt systems.

- D. Covers shall be sealed on non-interchangeable breakers, and trip unit covers shall be sealed on interchangeable trip breakers to prevent tampering. Circuit breaker ratings shall be clearly visible after installation, or engraved nameplates shall be provided stating the rating. All ferrous parts shall be plated to minimize corrosion.
- E. Circuit breakers shall be toggle, quick-make and quick-break operating mechanisms with trip-free feature to prevent contacts being held closed against overcurrent conditions in the circuit. Trip position of the breakers shall be clearly indicated by operating handles moving to a center position.
- F. Multipole breakers shall have a single handle to open and close all contacts simultaneously in both manual operation and under automatic tripping. Interpole barriers shall be provided inside the breaker to prevent any phase-to-phase flashover. Each pole of the breaker shall have means for Arc extinguishing.
- G. All terminals shall be rated at 75 degrees C for aluminum or copper wire.
- H. Circuit breakers with trip ratings 100 amp and smaller shall be ambient temperature compensated, thermal magnetic type unless otherwise noted. Breakers shall be of full size, 1 inch per pole type. Panels with more than one branch breaker larger than 100 amps shall be installed in distribution type panels.
- I. Circuit breakers with trip ratings 101 amps through 400 amps shall have solid state electronic trips with true RMS reading through the 13th harmonic with 1% accuracy, interchangeable trip via front accessible current plug, adjustable instantaneous and short time be rated as shown on drawings at the voltage indicated.
- J. Circuit breakers with trip ratings 401 amps through 1200 amps shall have electronic trips with the following characteristics:
 - 1. Electronic true RMS sensing trip, adjustable via current plug.
 - 2. Adjustable long time setting and delay.
 - 3. Adjustable short time pick-up and delay.
 - 4. Adjustable instantaneous pick-up.
 - 5. Mechanical targets on overload, ground fault, and short circuit.
- K. Accessories: Provide accessories as noted on the drawings, i.e. shunt-trip, auxiliary contacts, undervoltage trip, alarm switch, etc.
- L. Spaces in the boards shall be able to accept any combination of 1, 2 or 3 pole circuit breakers as indicated. Provide all necessary bus, device supports and mounting hardware sized for frame, not trip rating.
- M. Series rated breakers are not acceptable unless specifically noted on the Drawings.
- N. Refer to the Drawings for breakers requiring ground fault protection. .

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1. Mount securely to walls or structural spaces. Mount floor mounted

panelboards on 4-inch housekeeping pads.

- B. Height: Install wall mounted panelboards at 6 feet to the top of the enclosure.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typewritten circuit directory for each branch circuit panelboard mounted in permanent, clear Lexan card holder located on inside of door. Prepare directories only after permanent room numbers have been assigned. Do not use room numbers shown on construction drawings.
- E. Arrange branch circuit connections in 3 phase lighting and appliance panelboards such that when 2 or 3 circuits are run with a common neutral, each circuit is connected to a different phase.
- F. Distribute loading on circuits in panelboards to balance the load as evenly as possible in each phase.
- G. Terminate only one conductor under each lug of branch circuit breakers.
- H. Do not make splices or taps in panelboard gutters.
- I. Tighten electrical connectors and terminals; including screws and bolts, in accordance with equipment manufacturers published torque-tightening values for equipment connectors. Where manufacturers torque requirements are not indicated tighten connectors and terminals to comply with tightening torque specified in UL Standard 486A.
- J. Install overcurrent protective devices and accessories in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. All devices shall be installed in accordance with applicable NEC and NEMA standards for installation.
- K. Identify with arc flash data based on recommendations of Section 16053 Electrical System Coordination Study.

3.02 FIELD QUALITY CONTROL

- A. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

3.03 TESTING

- A. Refer to Specification Section 16080: Electrical Testing.

3.04 ADJUSTING

- A. Adjust circuit breaker trip settings based on recommendations of Section 16053 Electrical System Coordination Study.
- B. Adjust circuit breaker trip settings for coordination with other overcurrent protective devices in system.
- C. Adjust circuit breaker trip settings for adequate protection from overcurrent and fault

currents.

END OF SECTION 16442

SECTION 16491

FUSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Fuses and spare fuse cabinet.

1.03 REFERENCES

- A. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.04 DESIGN REQUIREMENTS

- A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for components such as wire, cable, bus structures, and other equipment. Design system to ensure that component damage is within acceptable levels during a fault.
- B. Select fuses to coordinate with time-current characteristics of other overcurrent protective elements, such as other fuses, circuit breakers, and protective relays. Design system to ensure that device closest to fault operates.

1.05 FUSE PERFORMANCE REQUIREMENTS

- A. Motor Load Feeder Switches: Class RK1 (time delay)
- B. Other Feeder Switches: Class RK1 (time delay).
- C. General Purpose Branch Circuits: Class RK1 (time delay).
- D. Motor Branch Circuits: Class RK1 (time delay).

1.06 SUBMITTALS

- A. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.
- B. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.08 MAINTENANCE MATERIALS

- A. Provide two fuse pullers.

1.09 EXTRA MATERIALS

- A. Supply three spare fuses of each Class, size, and rating installed.

PART 2 - PRODUCTS

2.01 FUSES

- A. Manufacturers: Bussman, Gould Shawmut, or approved equal.
- B. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.02 CLASS RK1 (TIME DELAY) FUSES

- A. Manufacturers: Bussman, Gould Shawmut, or approved equal.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.03 CLASS RK1 (NON-TIME-DELAY) FUSES

- A. Manufacturers: Bussman, Gould Shawmut, or approved equal.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.04 SPARE FUSE CABINET

- A. Manufacturers: Thomas & Betts, or Federal Pacific, or equal
- B. Product Description: Wall-mounted sheet metal cabinet with shelves, suitably sized to store spare fuses and fuse pullers specified.
- C. Doors: Hinged, with hasp for Owner's padlock.
- D. Finish: Gray enamel.

PART 3 - EXECUTION

3.01 EXISTING WORK

- A. Remove fuses from abandoned circuits.
- B. Ensure access to existing fuses and other installations which remain active and which require access. Modify installation or provide access panel as appropriate.

3.02 INSTALLATION

- A. Install fuse with label oriented such that manufacturer, type, and size are easily read.
- B. Install spare fuse cabinet where indicated.

END OF SECTION 16491

SECTION 16510

LIGHTING FIXTURES - BUILDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Light fixtures associated with building, including:
 - 1. Interior luminaires and accessories.
 - 2. Lamps.
 - 3. Ballasts.

1.03 RELATED SECTIONS

- A. Section 16050 - Electrical General Provisions.
- B. Section 16070 – Supporting Devices
- C. Section 16120 - Wire and Cable.
- D. Section 16132 - Conduit.
- E. Section 16423 - Contactors.
- F. Section 16900 - Lighting Control Systems

1.04 SUBMITTALS

- A. Product Data: Include product data for fixtures, including photometric data, reflectance, lens, lamps, ballasts, poles and lighting control.
- B. Samples: Furnish samples upon request.
- C. Operation and Maintenance Manual: Provide operation and maintenance manual.
- D. Furnish samples upon request of Architect/Engineer.
- E. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- F. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

1.05 REFERENCES

- A. California Energy Code, Title 24, Part 6.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Lighting Fixtures:

1. Manufacturers of individual lighting fixtures shall be as scheduled on Drawings, and indicate quality and design features required.
2. Products of other manufacturers will be considered upon submittal of proper data.

B. Lamps:

1. General Electric.
2. Philips.
3. Sylvania.
4. Venture.

C. Ballasts:

1. Advance.
2. Universal.
3. Valmont.

2.02 GENERAL

- A. Provide lighting fixtures of the size, type and rating indicated on the drawings, complete with lamps, lampholders, reflectors, ballasts, starters, wiring and accessories.
- B. Where fixtures are recessed mounted in ceiling system, provide trim and accessories required for installation in the ceiling system installed.
- C. It is the intent of the Drawings and Specifications to indicate the type of fixture for each intended use. It is generally intended that rooms of similar usage and configuration will have similar fixture types. Where fixture type is not indicated, it is the duty of the Contractor to request clarification prior to proceeding with the work.

2.03 FLUORESCENT BALLASTS

- A. Fluorescent Ballasts: Premium electronic; one, two, three, or four lamp, ballast factor not less than 0.9. Total harmonic distortion not greater than 10 percent.
- B. 430 ma Lamp Ballasts: Rapid start, premium type.
- C. Minus 20 degrees F rating when used in exterior or unheated areas.
- D. Certified and listed in the California Energy Commission Directory

2.04 HID BALLASTS

- A. High power factor type and potted for low noise level.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Support surface-mounted luminaires to ceiling using bolts, screws, or approved clips.
- B. Install recessed luminaires with proper frames in accordance with manufacturer's recommendations.
- C. Locate recessed luminaires as indicated on reflected ceiling plan.
- D. Do not install remote low voltage incandescent transformers more than 20 feet from lamp.
- E. Support pendant or bracket fixtures as indicated and as recommended by manufacturer for job conditions encountered.
- F. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend at indicated height. Install plumb and adjust to align with building lines and with each other.
- G. Luminaires installed within the wash bay and fuelling area of the Service building shall be secured or braced to prevent wind driven movement.
- H. Wall mount exit fixtures where shown above doors. Coordinate fixture location with actual door arrangement as indicated. Connect exit fixtures to unswitched power source as indicated.
- I. Connect fixtures designated as night lights to unswitched circuit and burn continuously.
- J. Connect photocell into system to signal darkness and timeclock to de-energize system at a preset time.
- K. Earthquake Protection:
 - 1. Provide earthquake clips.
 - 2. Provide earthquake seismic zone restraints for pendant mounted high bay fixtures.
- L. Install lamps in luminaires and lampholders.

3.02 FIELD QUALITY CONTROL

- A. Coordinate receipt and installation of all fixtures with regard to the overall schedule of the project.
- B. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt and debris from installed luminaires.
- C. Demonstrate proper operation of all luminaires and controls.
- D. Refer to Section 16050 regarding lamp replacement prior to final acceptance.

END OF SECTION 16510

SECTION 16520

LIGHTING FIXTURES - SITE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Light fixtures associated with site, including:
 - 1. Exterior luminaires and accessories.
 - 2. Lamps.
 - 3. Ballasts.
 - 4. Poles.
 - 5. Pole bases.

1.03 RELATED SECTIONS

- A. Section 02324 - Trenching.
- B. Section 03300 - Cast-in-Place Concrete.
- C. Section 16050 - Electrical General Provisions.
- D. Section 16120 - Wire and Cable.
- E. Section 16132 - Conduit.
- F. Section 16423 - Contactors.

1.04 SUBMITTALS

- A. Include product data for fixtures, including photometric data, reflectance, lens, lamps, ballasts, poles and lighting control.
- B. Furnish samples upon request.
- C. Provide operation and maintenance manual.
- D. Furnish samples upon request of Architect/Engineer.
- E. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- F. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

1.05 QUALITY ASSURANCE

- A. Manufacturers of individual lighting fixtures shall be as scheduled on Drawings; manufacturers scheduled represent quality and design features required. Products of other manufacturers will be considered upon submittal of proper data.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Lamps:
 - 1. General Electric.
 - 2. Sylvania.
- B. Ballasts:
 - 1. Advance.
 - 2. Universal.
 - 3. Valmont.

2.02 EXTERIOR LUMINAIRES AND ACCESSORIES

- A. Enclosures: Complete with gaskets to form weatherproof assembly.
- B. Provide low temperature ballasts, with reliable starting to minus 20 degrees F.
- C. Provide tempered glass lens in hinged door.

2.03 HID LAMPS

- A. Metal Halide:
 - 1. Clear, 4,000 K, standard output.
 - 2. Phosphor coated, 3,200 K, standard output.

2.04 HID BALLASTS

- A. High power factor, potted for low noise.

2.05 LIGHTING POLES

- A. As scheduled on Drawings. Provide poles compatible with fixtures, style, finish and mounting.
- B. Metal Poles: Steel lighting pole with anchor base. Provide permanent paint as scheduled, electrostatic powder epoxy finish, 3 to 5 mils thick. Straight or tapered round steel as scheduled. Provide color to match color of light fixtures.
- C. Wind Load: 100 miles per hour velocity with luminaires, brackets and related equipment mounted. Deflection at 30 feet above grade less than 5 inches from vertical with 100 miles per hour wind velocity and luminaires, brackets and related equipment mounted.

- D. Hand Hole: Drilled hand access hole at manufacturer's standard location. Provide matching gasketed cover plate.
- E. Provide additional assembly for mounting receptacles on selected poles as indicated.
- F. Anchor Bolts: As recommended by pole manufacturer. Provide template, flat washers, lock washers, and hex nuts for each pole. Provide bolt cover. Cover shall extend below anchor base to conceal leveling nuts.
- G. Each pole to have internal grounding lug.
- H. Mounting Brackets: As scheduled on Drawings. Provide mounting brackets compatible with pole, style, finish, and mounting.
- I. Provide winch assembly for all hinged poles. Provide two of each type and size required.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide new concrete pole bases for lighting poles. Contractor shall verify pole heights and sizes, and submit concrete base detail signed and sealed by licensed Structural/Civil engineer to A/E for approval. Install poles on bases plumb with anchor bolts that project 2 inches minimum above base and provide double nuts for adjustment. Grout around pole base after aligning pole. Install base cover. Base design to be installed with 30" above finished grade or as noted on the drawings. Exposed edges to be designed with chamfer to minimize chipping.
- B. Provide ground rod at each pole connected to ground lug with No. 6 AWG bare copper conductor.
- C. Use belt slings to raise and set pre-finished poles. Support and protect pole during lifting and setting operations to prevent damage to finish on poles.
- D. Provide styrofoam wedge at midpoint to prevent wire flapping inside pole and provide conductor stress relief at top of pole.
- E. Connect photocell into system to signal darkness and timeclock to de-energize system at a preset time.
- F. Install lamps in luminaires.
- G. Install and orient all hinged poles to allow on site access to luminaire in lowered position. Coordinate orientation with fences, all fixed appurtenances and structures.

3.02 FIELD QUALITY CONTROL

- A. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Repair luminaire and pole finish at completion of work to "as new" condition. If pole

finish is marred or damaged and cannot be restored to "as new" condition, replace pole.

- C. Aim luminaire as directed. Provide services of mechanic and bucket truck for night time adjustment before completion.
- D. Demonstrate proper operation of all luminaires and controls.
- E. Refer to Section 16050 regarding lamp replacement prior to final acceptance.

END OF SECTION 16520

SECTION 16530

EMERGENCY LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Emergency lighting units and exit signs.

1.03 RELATED SECTIONS

- A. Section 16050 - Electrical General Provisions.
- B. Section 16130 - Boxes.
- C. Section 16510 - Lighting Fixtures - Building: Exit signs.

1.04 REFERENCES

- A. NEMA WD 6 - Wiring Devices - Dimensional Requirements.

1.05 SYSTEM DESCRIPTION

- A. Emergency lighting to comprise self contained emergency lighting units and interior lighting luminaires equipped with conversion packs.

1.06 SUBMITTALS

- A. Product Data: Submit dimensions, ratings, and performance data.
- B. Samples: Submit two color chips 3 inches by 3 inches in size illustrating unit finish color.
- C. Furnish samples upon request of Architect/Engineer.
- D. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- E. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.08 MAINTENANCE MATERIALS

- A. Provide one replacement lamps for each lamp installed.
- B. Provide one replacement battery for each battery type and size.

PART 2 - PRODUCTS

2.01 EMERGENCY LIGHTING UNITS

- A. Self-contained emergency lighting unit as scheduled on the drawings.
- B. Battery: type as scheduled on the drawing, with 1.5 hour capacity.
- C. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
- D. Lamps: Compact fluorescent where scheduled on the drawings.
- E. Lamps: 12 watt minimum, sealed beam type in nickel or chrome plated steel housing, where scheduled on the drawings.
- F. Remote Fixtures: Match fixtures on unit.
- G. Housing: as scheduled on the drawings.
- H. Indicators: Lamps to indicate AC ON and RECHARGING. Voltmeter to indicate battery voltage.
- I. TEST switch: Transfers unit from external power supply to integral battery supply.
- J. Electrical Connection Conduit connection.
- K. Input Voltage: 277 volts.

2.02 EXIT SIGNS

- A. Manufacturers as scheduled on the drawings.
- B. Exit sign fixture suitable for use as emergency lighting unit.
- C. Housing: as scheduled on the drawings.
- D. Face: Translucent face with red letters on white background.
- E. Directional Arrows: As indicated
- F. Mounting: As indicated
- G. Battery: type as scheduled on the drawing, with 1.5 hour capacity.
- H. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.

I. Lamps: LED.

J. Input Voltage: 277 volts.

2.03 FLUORESCENT LAMP EMERGENCY POWER SUPPLY

A. Manufacturers as scheduled on the drawings.

B. Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire.

C. Lamp Ratings: type as scheduled on the drawing 1,100 lumens minimum unless noted otherwise.

D. Battery: Sealed lead calcium type, rated for 10-year life.

E. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install suspended exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend sign at indicated height.

B. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install wall-mounted emergency lighting units and exit signs at height as indicated

D. Install accessories furnished with each emergency lighting unit and exit sign.

E. Connect emergency lighting units and exit signs to branch circuit outlets provided under Section 16130 as indicated.

F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within unit.

G. Install specified lamps in each emergency lighting unit and exit sign.

H. Ground and bond emergency lighting units and exit signs under the provisions of Section 16050.

I. Install local emergency lighting test key switches where indicated to open the hot conductor powering the inverter units. Provide ten keys.

3.02 FIELD QUALITY CONTROL

A. Operate each unit after installation and connection. Inspect for proper connection and operation.

3.03 ADJUSTING

- A. Aim and adjust lamp fixtures as directed.
- B. Position exit sign directional arrows as indicated.

3.04 PROTECTION OF FINISHED WORK

- A. Relamp emergency lighting units and exit signs that have failed lamps at Substantial Completion.

END OF SECTION 16530

SECTION 16700

TELECOMMUNICATIONS BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes general administrative and procedural requirements for Sections numbering 167xxx, and is intended to supplement, not supersede, the requirements specified in Division 1.
- B. The requirements described herein include the following:
 - 1. References
 - 2. Definitions
 - 3. System Description and Existing Conditions
 - 4. Submittals
 - 5. Quality Assurance
 - 6. Delivery, Storage And Handling
 - 7. Scheduling
 - 8. Warranty
 - 9. Project Management and Coordination Services.
 - 10. Cutting, patching, painting and sealing.
 - 11. Field quality control.
 - 12. Project Closeout and Record Documents
- C. Related Items
 - 1. General: Consult other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation.
 - 2. Section 16705 - Telecommunications Rooms
 - 3. Section 16706 - Telecommunications Bonding
 - 4. Section 16708 - Telecommunications Pathways
 - 5. Section 16710 - Telecommunications Horizontal Cabling
 - 6. Section 16719 - Telecommunications Testing

1.03 REFERENCES

- A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
- B. Codes: Perform Work executed under this Section in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

1. National Electric Code (NEC), NFPA 70.
 2. California Code of Regulations (CCR) Title 24, California Building Standards Code Part 2, Basic Building Regulations and Part 3, California Electrical Code (CEC).
 3. Uniform Building Code (UBC).
 4. Uniform Fire Code (UFC).
 5. Uniform Mechanical Code (UMC).
 6. National, State, Local and other binding building and fire codes.
 7. FCC Regulations:
 - a. Part 15 - Radio Frequency Devices & Radiation Limits
 - b. Part 68 - Connection of Terminal Equipment to the Telephone Network
- C. Standards: Equipment and materials furnished under this Section shall conform to the following standards where applicable:
1. Underwriter's Laboratories (UL): Applicable listing and ratings.
 2. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard.
 - a. Part 1: General Requirements
 - b. Part 2: Balanced Twisted-Pair Cabling Components
 - c. Part 2, Addendum 1: Transmission Performance Specifications For 4-Pair 100 Ohm Category 6 Cable
 - d. Part 3: Optical Fiber Cabling Components Standard
 3. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces, including the following addenda:
 - a. TIA/EIA-569-A-1 Surface Raceways
 - b. TIA/EIA-569-A-2 Furniture Pathways and Spaces
 - c. TIA/EIA-569-A-3 Access Floors
 - d. TIA/EIA-569-A-4 Poke-Thru Fittings
 - e. TIA/EIA-569-A-6 Multi-Tenant Pathways and Spaces
 - f. TIA/EIA-569-A-7 Cable Trays and Wirelines
 4. ANSI/TIA/EIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 5. ANSI/J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
 6. EIA testing standards.
 7. BICSI Telecommunication Distribution Methods Manual.
- D. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
- E. Make a copy of each document readily available during the course of construction for reference by field personnel.

1.04 DEFINITIONS

- A. The Definitions of Division 1 shall apply to the 167xx sections.
- B. In addition to those Definitions of Division 1, the following list of terms as used in

this specification shall be defined as follows:

1. "Owner": Santa Cruz Metropolitan Transit District.
2. "Engineer": TEECOM Design Group.
3. "Furnish": To purchase, procure, acquire, and deliver complete with related accessories.
4. "Install": To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Make installation complete and ready for regular operation.
5. "Provide": To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation
6. "As directed": As directed or instructed by the Owner, or their authorized representative.
7. "Connect": To install required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
8. "Cabling": A system comprised of cables, wire, cords, and connecting hardware [e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling].
9. "Identifier": A unique code assigned to an element of the communications infrastructure that links it to its corresponding record.

1.05 SYSTEM DESCRIPTION

- A. In circumstances where the Specifications and Drawings conflict, the Drawings shall govern quantity and the Specifications shall govern quality.

1.06 SUBMITTALS

- A. General: Submit required submittals in accordance with Conditions of the Contract, and Division 1 Submittal Procedures Section.

B. Product Data

1. General: Product data submittals must be approved in writing by the Engineer prior to release of order for products and equipment, and prior to installation.
2. Quantity: Furnish quantity of product data submittals as described in Division 1.
3. Format:
 - a. Minimum Format: Provide each product data submittal in an 8-1/2 x 11 inch folder. Preferred Format: Provide each product data submittal in a 3-ring binder with front cover and spine clear pockets for insertion of the submittal information.
 - b. Clearly label the cover and the spine of each submittal with the following information:
 - 1) Client Name.
 - 2) Project Name and Address.
 - 3) Project Submittal Number.
 - 4) Submittal Name (e.g., "Product Data Submittal For Communications Equipment Rooms").
 - 5) Specification Section Number (e.g., "Section 16710").
 - 6) Date of Submittal. Format: <month> <day>, <year> (e.g., "January 1, 2000").

7) Contractor Name.

- c. Include a Table Of Contents at the beginning of the submittal that lists materials by article and paragraph number (e.g., "2.02-A Equipment Racks").
- d. Include tabbed separators for improved navigation through the submittal.

4. Content:

- a. Cover Letter: Product data submittals shall include a cover letter stating that the submittal is in full compliance with the requirements of the Contract Documents. Cover letter shall list in full the items and data submitted, and shall be signed (and stamped, if applicable) by the person who prepared the submittal. Failure to comply with this requirement shall constitute grounds for rejection of submittal.
- b. Product Information: Product Data submittal shall consist of manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary). This data shall clearly describe the product's characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories, which are included and those which are excluded. At a minimum, include products listed in the specifications numbering 167xx . Also include relevant products that will be installed, which are not listed in the specifications.
- c. Seismic Calculations: If required, include in the product data submittal the manufacturer's anchorage calculations for floor mounted fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for drilled-in anchors, if used. A Structural Engineer registered in the State of California shall prepare calculations and shall wet stamp and sign them. Forward calculations to the City of Santa Cruz for review and approval.
- d. Resubmittals: Resubmittals shall include a cover letter that lists the action taken and revisions made to each product submittal in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

C. Submittal Description: Shop Drawings

- 1. General: Obtain written approval from the Engineer for the shop drawings prior to the release of materials and equipment purchase order and prior to installation.
- 2. Quantity & Media: Furnish quantity of shop drawing submittals as described in Division 1.
- 3. Format:
 - a. Prepare shop drawings using AutoCAD Release 14 or later.
 - b. Use the same plot size as the Contract Documents drawings.
 - c. Use the project title block.
 - d. Text: minimum of 3/32" high when plotted at full size.
 - e. Use symbols identical to those in the Contract Documents drawings.

- f. Screen background information.
- g. Plot system components (devices, pathways, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
- h. Label each sheet in the shop drawings set with the Specification Section Number (e.g., "16710").
- i. Scaling:
 - 1) Scale floor plans at 1/8"=1'-0".
 - 2) Scale enlarged room plans at 1/4"=1'-0".
 - 3) Scale wall elevations at 1/2"=1'-0".
 - 4) Scale rack elevations at 1"=1'-0".

4. Content:

- a. Submit detailed shop drawings if the proposed installation differs from the Contract Documents or the design intent.
- b. Cover Letter: Accompany each shop drawing submittal with a cover letter stating that the shop drawings have been thoroughly reviewed by the Contractor and are in full compliance with the requirements of the Contract Documents. Cover letters shall include a drawing index, and shall be signed (and stamped, if applicable) by the person who prepared the submittal. Failure to comply with this requirement shall constitute grounds for rejection of submittal.
- c. Drawing Information: Shop drawing submittals shall consist of floor plans, enlarged room plans, wall and rack elevations, installation details, and other aspects of the system that differ from the Contract Documents or the design intent. Use the same scales as the Drawings (e.g., 1/4" = 1'-0" for enlarged room plans).
- d. Seismic Calculations: As part of the shop drawings submittal, the manufacturer shall provide anchorage calculations for floor mounted fully loaded distribution frames such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for drilled-in anchors, if used. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the City of Santa Cruz for review and approval.
- e. Resubmittals: Accompany resubmittals with a cover letter that lists the revisions made to each drawing in response to Submittal Review Comments. Resubmittals will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

D. Submittal Description: Record Drawings

- 1. Quantity & Media: Furnish quantity of record drawing submittals as described in Division 1.
- 2. Format:
 - a. Prepare record drawings using AutoCAD Release 14 or later.
 - b. Use the same plot size as the Contract Documents drawings.
 - c. Use the project title block.
 - d. Text: minimum of 3/32" high when plotted at full size.
 - e. Use symbols identical to those in the Contract Documents drawings.

- f. Screen background information.
 - g. Plot system components (devices, pathways, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
3. Content:
- a. Record Drawings shall fully represent actual installed conditions and shall incorporate revisions made during the course of construction.
 - b. Floor plans shall show:
 - 1) Locations and identifiers of outlets.
 - 2) Size, quantity, location, and routes of pathways (such as cable trays, conduits, J-hangers, and other cable support devices).
 - c. Enlarged room floor plans scaled at 1/2"=1'-0" showing exact placement of equipment cabinets/frames, rack bays, and other equipment. Enlarged room overhead plans scaled at 1/2"=1'-0" showing exact placement of overhead cable support devices (e.g., cable tray, cable runway, conduit sleeves, etc.).
 - 1) Applicable rooms: Server Room, PBX Equipment Room, MDF, Entrance facilities, BDFs, IDFs.
 - d. Wall elevations scaled at 1"=1'-0" showing exact placement of termination hardware (e.g., termination/crossconnect blocks).
 - e. Installation details.

E. Submittal Description: Operation and Maintenance (O & M) Manuals

- 1. Quantity: Furnish quantity of O&M Manuals as described in Division 1.
- 2. Format:
 - a. Furnish each O & M Manual in a white, 3-ring binder with front cover and spine clear pockets for insertion of the project information.
 - b. Clearly label the cover of each O & M Manual with the following information:
 - 1) Client Name.
 - 2) Project Name and Address.
 - 3) Manual Name (e.g., "Operation And Maintenance Manual for Telecommunications Cabling System").
 - 4) Date of Submittal. Format: <month> <day>, <year> (e.g., "January 1, 2000").
 - 5) Contractor Name.
 - c. Include a Table Of Contents at the beginning that lists the contents.
 - d. Include tabbed separators for improved navigation through the manual.
- 3. Content:
 - a. 11"x17" prints of As-Built Drawings, as described above.
 - b. Manufacturer's original catalog information sheets for each component provided under applicable Section.
 - c. Warranty certificate from the manufacturer and the Contractor.
 - d. Manufacturer's instructions for system or component use.

- e. Instructions for maintenance and warranty issues.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Five continuous years, minimum, design and manufacture of the materials and equipment specified herein.
2. Manufacturer(s) of products and equipment specified herein shall demonstrate that they have a quality assurance program in place to assure that the specifications are met. The program shall include, as a minimum, provisions for:
 - a. Incoming inspection of raw materials
 - b. In-process inspection and final inspection of the cable product
 - c. Calibration procedures of test equipment to be used in the qualifications of the product
 - d. Recall procedures in the event that out of calibration equipment is identified.
3. Conformance to certain government standards on quality assurance may be required for some applications within these specifications.

B. Contractor Qualifications

1. A current, active, and valid and C7 or C10 California State Contractors License.
2. Five continuous years, minimum, experience
3. Five, minimum, completed projects similar to scope and cost.
4. Evidence of technicians qualified for the work.

C. Materials

1. Provide new materials and equipment without defects.
2. Furnish only specified products and equipment, or products and equipment that have been approved in writing.

D. Regulatory Requirements

1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Nothing in these specifications is to be construed to permit work not conforming to the most stringent of the applicable codes.
2. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
3. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this series of Sections, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The Contract Documents address the minimum requirements for construction.

E. Project Management And Coordination Services

1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility shall include, but shall not be limited to the items listed in this section.
2. Review of Shop Drawings Prepared by Other Subcontractors:
 - a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with Division 16 work.
 - b. Perform a thorough review of the shop drawings to confirm compliance with the service requirements contained in the Division 16 contract documents. Document discrepancies or deviations as follows:
 - 1) Prepare memo summarizing the discrepancy.
 - 2) Provide a copy of the specific shop drawing, indicating via cloud, the discrepancy.
 - c. Prepare and maintain a shop drawing review log indicating the following information:
 - 1) Shop drawing number and brief description of the system/material.
 - 2) Date of your review.
 - 3) Indication if follow-up coordination is required.

F. Drawings

1. Layout: Follow the general layout shown on the Drawings except where other work may conflict with the Drawings.
2. Accuracy: Drawings for the Work within this Division are essentially diagrammatic within the constraints of the symbology applied.
3. The Drawings do not fully represent the entire installation for the Telecommunications Cabling System. Drawings indicate the general route for the cables and the location of outlets. Conduits, sleeves, hangers, etc. - for the most part - are not shown.
4. Complete the details necessary for point-to-point design. This allows the Contractor to achieve desired results applying their own procedures and methods. Submit shop drawings for review prior to installation.

G. Role of the Engineer

1. During the construction phase of the project, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and 'process') relevant Requests for Information (RFIs), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for general compliance with the Contract Documents and to ensure that the installation meets the design intent of the system.
3. In summary, the Engineer will perform the following specific services during the construction phase:
 - a. Review product submittals and shop drawings for general compliance with the contract drawings and specifications.
 - b. Review changes as they arise, and confirm that the proposed solutions

- c. maintain the intended functionality of the system.
- c. Interpret field problems for Owner, and translate into understandable language.
- d. Review the testing procedures to confirm compliance with industry-accepted practices.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery
 - 1. Products shall not be delivered to the site until protected storage space is available.
 - 2. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
 - 3. Deliver materials in manufacturer's original, unopened, undamaged packaging and containers with identification labels (name of the manufacturer, product name and number, type, grade, UL classification, etc.) intact.
 - 4. Replace equipment damaged during shipping at no cost to the Owner.
- C. Storage and Protection
 - 1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.
 - 2. Comply with manufacturer's requirements for each product. Comply with recommended procedures, precautions or remedies as described in the Material Safety Data Sheets (MSDS) as applicable.
 - 3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
 - 4. Storage outdoors covered by rainproof material is not acceptable.
 - 5. Provide heat where required to prevent condensation or temperature related damage.
- D. Handling
 - 1. Handle in accordance with manufacturer's written instructions.
 - 2. Damaged equipment shall not be installed.
 - 3. Replace damaged equipment at no cost to the Owner.
 - 4. Handle with care to prevent internal component damage, breakage, denting, and scoring.

1.09 SCHEDULING

- A. Unless otherwise specified, the construction schedules of the 167xx series Sections may be combined.

1.10 WARRANTY

- A. Service must be rendered within 24 hours of system failure notification. Note deviations or improvements to this service at the time of bid.
- B. Provide a 15-year, minimum, manufacturer's warranty for the twisted pair cabling

- systems from the date of acceptance.
- C. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department or stocking distributor shall be located close enough to the job site area to supply replacement parts within a 24 hour period.
 - D. Warrant installed hardware, under normal use and service, to be free from defects and faulty workmanship during the warranty period. Keep the system in operating condition at no additional material or labor costs to the Owner during the warranty period.
 - E. The manufacturers shall demonstrate that a quality assurance program is in place to assure that the specifications are met. The program shall include, as a minimum, provisions for:
 - 1. Incoming inspection of raw materials
 - 2. In-process inspection and final inspection of the product
 - 3. Calibration procedures of test equipment to be used in the qualifications of the product
 - 4. Recall procedures in the event that out of calibration equipment is identified.
 - F. Conformance to certain government standards on quality assurance may be required for some applications outlined in these specifications.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards, other applicable federal, state, and local laws.
- B. Product numbers listed in the 167xx series sections in are subject to change by the manufacturer without notification. In the event a product number is invalid or conflicts with the written description, notify the General Contractor in writing prior to ordering the material and performing installation work.

2.02 SUBSTITUTIONS

- A. Requests for substitutions shall conform to the general requirements and procedure outlined in Division 1.
- B. Where items are noted as "or approved equivalent", a product of equivalent design, construction and performance will be considered. Include in the Product Data submittal: catalog cuts, product information, and pertinent test data required to substantiate that the product is in fact equivalent to that specified.
- C. Only one substitution will be considered for each product specified. Do not use substitution material, processes or equipment without written authorization from the Engineer. Assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer is at the sole risk of the Contractor.
- D. Substitutions shall be equivalent, in the opinion of the Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Engineer in writing accepts a substitution, it is with the understanding that the

Contractor guaranteed the substituted product, component, article, or material to be equivalent to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from provisions of the Specifications.

- E. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment that, in the opinion of the Engineer, are equivalent in quality, utility and appearance will be approved as substitutions to that specified when "or equivalent" follows the manufacturers' names and model number(s).
- F. Whenever material, process or equipment is specified in accordance with a TIA/EIA specification, an ANSI specification, UL rating or other association standard, present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, submit supporting test data to substantiate compliance at no additional cost.
- G. Pay expenses, without additional charge to the Owner, in connection with substitution materials, processes and equipment, including the effect of substitution on self, subcontractor's or other Contractor's work

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Conditions: Verify existing conditions, which have been previously provided under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. Pathways: Verify that pathways and supporting devices, which have been previously provided under other sections, are properly installed, and that temporary supports, devices, etc., have been removed.
- C. Field Measurements: Verify dimensions of pathways, including length of pathways. For example, "True Tape" the conduits to verify cable distances.

3.02 FIELD QUALITY CONTROL

- A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule.
- B. Project Management: Coordinate and attend weekly status meetings to review the overall progress and issues to be resolved throughout the course of construction. Prepare and distribute meeting agenda prior to and meeting notes after meetings in a format acceptable to the General Contractor.
- C. Scheduling: Prepare an overall construction schedule based on the results of the planning meetings with the General Contractor. Issue schedule to General Contractor for approval. Prepare and issue updated schedules whenever there are modifications.
- D. Inspection: Perform inspection after installation. Keep areas of work accessible and

notify code authorities, or designated inspectors, of work completion released for inspection. Document completion, and inspection as required.

3.03 INSTALLATION

- A. Complete work in a neat, high quality manner.
- B. Conform to applicable federal, state and local codes, and telephone standards.
- C. Coordinate the entire installation with the General Contractor, and their subcontractors, to meet the construction schedule. Include coordination meetings as required to fulfill this requirement.
- D. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.
- E. Manufacturer's Instructions:
 - 1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
 - 2. Maintain jobsite file and comply with Material Safety Data Sheets (MSDS) for each product delivered to jobsite.
- F. Adjusting:
 - 1. Make changes and revisions to the system to optimize operation for final use.
 - 2. Make changes to the system such that defects in workmanship are corrected and cables and the associated termination hardware pass the minimum test requirements.
- G. Protection
 - 1. Protect installed products and finish surfaces from damage during construction.

3.04 REPAIR AND RESTORATION

- A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.
- B. Punch List:
 - 1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
 - 2. Provide punch list to Engineer for review prior to performing punch walk with the Engineer.
- C. Re-Installation:
 - 1. Make changes to adjust the system to optimum operation for final use. Make changes to the system such that defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
 - 2. Repair defects prior to system acceptance.

3.05 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.
- B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.
- C. Repair or replace damaged installed products.
- D. Legally dispose of debris.
- E. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

3.06 DEMONSTRATION

- A. On completion of the acceptance test, schedule a time convenient with the Owner, or owner's representatives, for instruction in the configuration, operation, and maintenance of the system.
- B. Provide 2 hours, minimum, of on-site training by a factory-trained representative. Document dates and times of training, and submit a "sign in" sheet for individuals trained, as part of the close out documentation.

3.07 CERTIFICATION

- A. Provide to Owner a written form of acceptance for signature. Corrections must be completed before Owner will give acceptance.

END OF SECTION 16700

SECTION 16705

TELECOMMUNICATIONS EQUIPMENT ROOMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Build out of telecommunications rooms and spaces.
- B. Products Furnished and Installed by the Owner:
 - 1. Network switches, PBX equipment, and telephone handsets
 - 2. Installation of patch cords for data interconnectivity.
- C. Related Divisions:
 - 1. Comply with the Related Sections paragraph of Section 16700.
 - 2. Consult other Divisions, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.

1.03 REFERENCES

- A. Comply with the References requirements of Section 16700.
- B. In addition to those codes, standards, etc., list in 16700, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. ANSI/EIA-310-D-1992 Racks, Panels And Associated Equipment

1.04 DEFINITIONS

- A. Refer to the Definitions requirements of Section 16700.

1.05 SYSTEM DESCRIPTION

- A. Base Bid Work:
 - 1. Telecommunications Room build out includes the following work:
 - a. Submittals.
 - b. Rack bays (equipment racks, vertical management sections, anchoring, and bracing).
 - c. Overhead support system.
 - d. Cable, wire and patch cord management.
 - e. Seismic bracing.
 - f. Identification tags and labeling.
 - g. Record Documents.

h. Warranty.

1.06 SUBMITTALS

- A. Refer to Submittals of Section 16700 for procedural, quantity, and format requirements.
- B. Pre-Construction Submittal Requirement: Submit the following prior to the start of construction.
 - 1. Product Data Submittal: Submit product data on products listed in this section and products not listed in this section to be installed related to this section.
 - 2. Sample Submittal: Submit sample of equipment rack label.
 - 3. Seismic Calculations: Rack anchorage into concrete flooring with overall rack bracing.
 - 4. Schedule Submittal: Submit proposed schedule of work (this schedule may be combined with the schedule developed for the 167xx series Sections).
 - 5. Shop Drawings Submittal: Consisting of proposed changes to room plans.
- C. Submittal Requirements at Closeout:
 - 1. As-Built Drawings.
 - 2. O & M Manuals.

1.07 QUALITY ASSURANCE

- A. Refer to Quality Assurance requirements of Section 16700.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Refer to Product Delivery, Storage and Handling requirements of section 16700.

1.09 WARRANTY

- A. Refer to Warranty requirements of section 16700.

PART 2 - PRODUCTS

2.01 EQUIPMENT RACK BAY

- A. Equipment Rack, 2-Channel Type:
 - 1. Application: Suitable for the support of cable termination devices, management devices, common communications equipment, and other similar equipment.
 - 2. Material: High strength, lightweight 6061-T6 aluminum, extrusion construction.
 - 3. Channel:
 - a. Size: The mounting channels shall be 3” deep by 1.265” wide with a 0.17” thick web.
 - b. Flange: The mounting channels shall have front and back mounting flanges (“double sided”). The flanges shall be 0.25” thick, and shall have mounting holes front and back.

- c. Mounting Holes: The hole pattern shall be industry standard spaced at 5/8" - 5/8" - 1/2", compatible with ANSI/EIA-310-D (1992) standard. The mounting holes shall be pre-threaded as #12-24 rolled threading.
 - 4. Assembled Rack: The rack shall come complete with base angles (3.5" high by 6" deep by 0.375" thick) and top angles (1.5" high by 1.5" deep by .375" thick). The assembled rack shall be 7'-0" high (overall) by 19" mounting width (20.25" wide overall), and shall contain 45 EIA mounting spaces (1.75").
 - 5. Include required accessories, such as floor installation kit, etc. for a complete installation.
 - 6. Manufacturer: CPI, or approved equivalent:
 - a. #46353-703, 7'-0"H x 19" equipment rack, black.
- B. Vertical Management Sections:
 - 1. Application: Suitable for cable routing (back) & cord slack storage (front) vertically from the bottom of the rack to the top. The vertical management sections shall be double sided (i.e., the management section shall have covered cable guides on the front and flip-retainers on the rear).
 - 2. Size & Capacity: 7'-0" high by either 6" wide or 4.5" wide, with 5-1/3" deep cable storage capacity in back and 6" cord storage capacity in front.
 - 3. Mounting: The vertical management section shall have matching bolt holes for attachment to the rack.
 - 4. Color: black (guides and cover).
 - 5. Manufacturer: CPI, or approved equivalent:
 - a. #30162-703, vertical mngt section, 7'-0"H x 6"W, double sided.
 - b. #30161-703, vertical mngt section, 7'-0"H x 3.65"W, double sided.
- C. Horizontal Management Panels:
 - 1. Application: Suitable for installation into equipment rack for cord routing (front). The horizontal management panel shall match (and fully integrate with) the vertical management sections.
 - 2. Size & Capacity: 2U high, with hinged/removable cover and pass through capacity.
 - 3. Color: black.
 - 4. Manufacturer: CPI, or approved equivalent:
 - a. #30130-719; horizontal cable manager with removable hinged front cover.

2.02 CABLE RUNWAY

A. Cable Runway Straight Sections:

- 1. Application: Suitable for the support & management of communications cables, either overhead or mounted vertically on a wall. Also overhead equipment racks bracing.
- 2. Material (both stringer and rung): Steel tube, rectangular, 1-1/2" by 3/8" by 0.65" wall thickness.
- 3. Rungs: 12" on center, welded to stringer.

4. Size: 9' 11-1/2" straight sections; width: refer to Drawings.
 5. Manufacturer:
 - a. CPI #10250-712, 12" wide universal cable runway, black.
 - b. CPI #10250-718, 18" wide universal cable runway, black.
 - c. CPI #10250-724, 24" wide universal cable runway, black.
- B. Cable Runway Installation Accessories:
1. Application: Installation accessories for use with cable runway.
 2. Refer to Drawings for additional information and instances for installation.
 3. Manufacturer:
 - a. CPI #11301-001, butt splice kit.
 - b. CPI #11314-001, 90-degree butt splice kit.
 - c. CPI #11302-001, junction splice ("T") kit.
 - d. CPI #10608-001, vertical wall bracket kit.
 - e. CPI #10642-001, end caps.
 - f. CPI #11421-712, wall angle support kit for 12" wide cable runway, black.
 - g. CPI #11421-718, wall angle support kit for 18" wide cable runway, black.
 - h. CPI #11421-724, wall angle support kit for 24" wide cable runway, black.
 - i. CPI #11312-718, triangle support kit for 12" and 18" cable runway, black.
 - j. CPI #11770-712, end closing kit for 12" wide cable runway, black.
 - k. CPI #11770-718, end closing kit for 18" wide cable runway, black.
 - l. CPI #11770-724, end closing kit for 24" wide cable runway, black.
 - m. CPI #10595-718, rack-to-runway attachment kit, for 18" wide runway, black.

2.03 LABEL PLATES FOR EQUIPMENT RACKS

- A. Application: Label plate shall be suitable to affix onto top angle of equipment rack.
- B. Label plate shall be 'engrave-able' stock melamine plastic laminate substrate.
 1. Size (minimum): 1/2 inch high by 6 inches long by 1/16-inch thick.
 2. Color: Black.
- C. Lettering shall be engraved, shall be 1/8" high, and shall be white.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with the General Execution requirements of Section 16700.

3.02 INSTALLATION

- A. Rack Bays:
 1. Equipment Racks:
 - a. Provide parts and accessories required to complete each rack.
 - b. Anchor racks to the floor using structural engineer approved concrete anchors.
 - c. Brace racks overhead to cable runway where shown on the Drawings.

2. Vertical Management Sections:
 - a. Provide vertical management sections as shown on Drawings. If not shown, default shall be one vertical management section between each rack and at either end of the bay.
 - b. Bolt vertical management sections to the equipment racks at the points designed by the manufacturer and per the manufacturer's installation instructions.
 - c. Install support devices (e.g., brackets, threaded rod with strut, etc.) per the manufacturer's instructions and fastened to the wall or ceiling using appropriate fasteners.
 3. Tolerances:
 - a. Equipment Rack: Field verify dimensions to establish proper clearances as follows:
 - 1) Front: 40" clearance from channel's front mounting flange.
 - 2) Back: 57" clearance from channel's back mounting flange.
 - b. Provide the correct amount of space between each rack for proper installation (according to manufacturer's written instructions) of the vertical management sections.
 4. Accessories:
 - a. Furnish one bag of 50 mounting screws per IDF room.
- B. Overhead Cable Support:
1. Install support devices (e.g., brackets and threaded rod with strut) per the manufacturer's instructions and fastened to the wall or ceiling using appropriate fasteners.
 2. Tolerances:
 - a. Install the overhead cable support centered over the equipment rack, or as shown on the Drawings.
 3. Interface With Other Work: Coordinate the installation of the overhead cable support with other trades. Trapeze supports and 'hanger rods' ("all-thread"), for example, may be shared to lower overall construction cost.
- C. Vertical Cable Runway:
1. Provide cable support installed vertically at the locations as shown on the Drawings for use to support cables routing vertically within telecom rooms.
 2. Provide parts required to complete the installation (e.g., vertical mounting brackets, bolts, etc.).
 3. Install the cable runway such that the rungs are facing outward (the greater distance from the rung to the stringer edge is facing inward).

3.03 LABELING

- A. General Requirements: Labeling and identifier assignment shall conform to TIA/EIA-606 Administration Standard and as approved by Owner before installation.
- B. Equipment Rack Label Requirements: Provide one label plate per rack. Permanently affix label plate and position as shown on the Drawings; if not shown on the Drawings, center the label plate on the rack's front top angle.

C. Identifier Assignment:

1. Equipment Racks:
 - a. Prefix: "RACK."
 - b. First field: the room identity; for example: "M2.1".
 - c. Second field: the rack number; for example: "01".
 - d. Example; "RACK M2.1-01".

END OF SECTION 16705

SECTION 16706

TELECOMMUNICATIONS BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Labor, materials and equipment necessary to bond communications infrastructure devices and equipment to Communications Grounding Backbone.
- B. Related Sections
 - 1. Comply with the Related Sections paragraph of Section 16700.
 - 2. Refer to Division 16 grounding requirements.

1.03 REFERENCES

- A. Comply with the References requirements of Section 16700.
- B. In addition to those codes, standards, etc., list in Section 16700, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. NFPA 70, National Electric Code:
 - a. Chapter 8: Communications Systems
 - b. Article 250: Grounding
 - 2. Underwriters Laboratories, Inc. (UL) UL 467: Grounding and Bonding Equipment.
 - 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. IEEE 467: IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - b. IEEE P1100: IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems

1.04 DEFINITIONS

- A. Definitions as described in Section 16700 shall apply to this section.
- B. In addition, the following list of terms as used in this specification shall be defined as follows:
 - 1. "CM": Circular Mil.
 - 2. "MBRGB": Main Building Reference Grounding Busbar.
 - 3. "TBB": Telecommunications Bonding Backbone.

4. "TBC": Telecommunications Bonding Conductor.
5. "TGB": Telecommunication Grounding Busbar.
6. "TMGB": Telecommunication Main Grounding Busbar.

1.05 SYSTEM DESCRIPTION

A. Base Bid Work

1. TGB within IDF as noted on Drawing.
2. Telecommunications bonding backbone from TGB to Building's main ground reference point. Refer to Electrical for this information.
3. TBCs from the busbar within IDF to the following components:
 - a. Rack bay.
 - b. Overhead cable support.
 - c. Ground bushings installed on each conduit opening within the IDF.
4. Grounding jumpers between cable runway joints and splices, and between cable runway and the equipment racks.

1.06 SUBMITTALS

A. General: Conform to Submittal requirements as described in Section 16700.

B. Quantity: Furnish quantities of each submittal as noted in Section 16700.

C. Product Data Submittal:

1. Format: As described in Section 16700.
2. Content: In addition to requirements of Section 16700, include the following:
 - a. Product Data: "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) of bonding devices and installation accessories. This data shall clearly describe the physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish.
 - b. Clearly indicate by arrows or brackets precisely the model and accessories submitted on.

D. Substitutions:

1. Requests for substitutions shall conform to the general requirements and procedure outlined in Section 16700.

1.07 QUALITY ASSURANCE

A. Comply with Quality Assurance requirements of Section 16700.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with Delivery, Storage and Handling requirements of Section 16700.

PART 2 - PRODUCTS

2.01 BONDING CONDUCTORS

A. TBC:

1. Conductor: #6 AWG (up to 25 feet) stranded copper.
2. Insulation: Low-smoke, green in color. The following shall be printed on the conductor's jacket: insulation grade, conductor gauge, and applicable UL jacket listings.
3. Type THHN, or equal.

B. Cable Runway Bonding Straps:

1. Conductor: Flexible braided straps with factory terminated connectors.
2. Manufacturer: Chatsworth Products Inc #12061-001, or equal.

2.02 CONECTORS

A. General: Connectors shall be UL listed.

B. TBC-To-TGB/TMGB Connection:

1. Lug, one-hole standard barrel compression lug.
2. Manufacturer: Panduit #LCD6-14A-L; two hole (1/4" dia. x 5/8" on center) standard barrel lug for #6 AWG conductor, or equal.

C. TBC-To-Runway Connection:

1. Lug, two-hole single barrel screw termination lug.
2. Manufacturer: Panduit #HL4-2-X; one hole (1/4") 'premium' single barrel screw lug for #6 AWG, or equal.

D. TBC-To-Equipment Rack Connection:

1. Lug, one-hole standard barrel compression lug.
2. Manufacturer: Panduit #LCA6-14-L; one hole (1/4") standard barrel compression lug for #6 AWG, or equal.

PART 3 - EXECUTION

3.01 GENERAL

- #### A. Comply with the Execution requirements of Section 16700.

3.02 EXAMINATION

- #### A. Examine existing Communications Grounding Backbone system prior to the start of work within this section. The Telecommunications Contractor is solely responsible to ensure work proposed within this section is fully compatible, in the opinion of the Engineer, with the existing Communications Grounding Backbone system.

3.03 INSTALLATION

A. Telecommunication Bonding Conductors:

1. Refer to Drawings for TBC sizing. If not shown, size TBCs as the greater of 6 AWG or based on length of run using 1000CM/linear foot.
2. Install TBCs in a manner that will protect them from physical and mechanical damage.
3. Routing:
 - a. Route TBCs in the shortest possible path, using right-angles for turns and routed parallel to building lines.
 - b. Utilize a minimum 1 foot bend radius.
4. At TMGB/TGBs:
 - a. Thoroughly clean non electrotin-plated busbar prior to fastening the conductors, bolts, or connectors to the busbar.
 - b. Attach lugs to busbar with appropriate size cadmium bronze bolt, flat washer and Belleville washer.
 - c. Torque connections.

B. Rack Bay & Overhead Cable Runway Bonding:

1. Refer to Drawings for detailed diagrammatic requirements for rack bay bonding.
2. Rack Bay: Bond equipment racks, frames, frame bays, cabinets, server racks, and other similar support systems located within the same room or space as the TMGB/TGB to the busbar.
3. Overhead Runway:
 - a. Bond overhead runway located within the same room or space as the TMGB/TGB to the busbar.
 - b. Provide “grounding kit” (straps & connectors) to bond sections of cable runway for ground continuity. This requirement shall apply to sections of cable runway within a single communication room.

3.04 LABELING

A. General Requirements:

1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner’s Representative before installation.
2. Permanently label TBCs. Affix label as close as practical to each end of the conductor.

B. Label Format:

1. Labels shall be permanent with machine-generated text; hand written labels will not be accepted.
2. Labels on TBCs shall fully wrap around conductors with a self-laminating feature to provide permanent marking.

C. Identifier Assignment:

1. Separate label fields of the identifier with a hyphen.

2. TBC:
 - a. First field: "TBC" (the bonding conductor type).
 - b. Second field: The room identity where TBC exists; for example: "M2.1".
 - c. Third field: Connecting component/apparatus; for example: "Rack Bay".
 - d. Example: "TBC-M2.1-Rack Bay."

3.05 RECORDS

- A. Telecommunication Bonding System records shall conform to TIA/EIA-606-A Administration Standards. Each component shall have as a minimum, the information as outlined in Table 4.7-1 of TIA/EIA-606-A.

END OF SECTION 16706

SECTION 16708

TELECOMMUNICATIONS PATHWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Telecommunications building pathways.
- B. Related Sections
 - 1. Comply with the Related Sections paragraph of Section 16700.
 - 2. Section 16710 – Telecommunications Horizontal Cabling.

1.03 REFERENCES

- A. Comply with the References requirements of Section 16700.

1.04 DEFINITIONS

- A. Definitions as described in Section 16700 shall apply to this section.
- B. “Snake Tray”: A welded steel wire cable conveyance system consisting of flexible linear or module sections designed to support. Where field formed bends are required, hand bend the linear sections in any direction along any plane without tools, cutting, clipping or modifications of the tray in order to complete the bend.
- C. “Cable Hanger”: A metal or fabric, most often steel, cable support device shaped (section view) similar to the letter J. The device is available in different sizes supporting different quantities of cables, and is also available with different attachment hardware to be supported by different methods (e.g., wire support, beam flange clip, etc.).

1.05 SYSTEM DESCRIPTION

- A. Base Bid Work:
 - 1. The work under this section shall include the planning and coordination with General Contractor (and other trades) of communications system pathways, the furnishing of necessary materials, and the labor & associated services required to install communications pathways.
 - 2. Telecommunications Pathways consist of the following subsystems:
 - a. Primary Pathways – from the IDF to through the Building.
 - b. Secondary Pathways – from the primary pathways to the Device.
 - c. Device Pathways – at the telecom device.
 - 3. Refer to the Drawings for specific pathway components, sizes, and routes.

1.06 SUBMITTALS

- A. General: Conform to Submittal requirements as described in Section 16700.
- B. Quantity: Furnish quantities of each submittal as noted in Section 16700.
- C. Submittal Requirements at Start Of Construction:
 - 1. Product Data Submittal
 - 2. Shop Drawings Submittal: Consisting of proposed changes to pathway route plans.
- D. Submittal Requirements at Close Out:
 - 1. As-Built Drawings Submittal.
- E. Substitutions:
 - 1. Requests for substitutions shall conform to the general requirements and procedure outlined in Section 16700.

1.07 QUALITY ASSURANCE

- A. Comply with Quality Assurance requirements of section 16700.
- B. NFPA Compliance: Comply with NFPA 70B, "Recommended Practice for Electrical Equipment Maintenance" pertaining to cable tray series of specifications.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with Delivery, Storage and Handling requirements of section 16700.

1.09 WARRANTY

- A. Comply with Warranty requirements of section 16700.

PART 2 - PRODUCTS

2.01 CABLE BASKET

- A. Application: Suitable for the support & management of telecommunications cables, either overhead or mounted vertically on a wall. Also overhead equipment racks bracing.
- B. Size: Refer to Drawings.
- C. Material: Make straight sections from high strength steel wires meeting the minimum mechanical properties of ASTM A510 and formed into a standard 2 inch by 4-inch wire mesh pattern with intersecting wires welded together. Round wire ends along sides (flanges) during manufacturing for safety of cables and installers. Provide straight longitudinal wires(with no bends).
- D. Finish: Electro-plate straight sections yellow zinc dichromate in accordance with ASTM B633 SC2.
- E. Provide bolted type splicing assemblies using serrated flange locknuts. Provide yellow zinc dichromate hardware in accordance with ASTM B633 SC2 or AISI Type 304 Stainless Steel.

- F. Pathway component shall comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
1. ASTM A 510 Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
 2. ASTM B 633 Specifications for Electrodepositing Coatings of Zinc on Iron and Steel, Sections SC2 and SC3.
 3. ASTM A653 Specifications for Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process
 4. ASTM A591 Specifications for Electrodepositing Coatings of Zinc on steel wire or sheets.
 5. ASTM A123 Specifications for Zinc (Hot Galvanized) Coatings on Iron and Steel.
- G. Manufacturer:
1. Cablofil “EZ-Tray” series; refer to Drawings for tray sizes.
 2. Cooper B-Line “WB” series; refer to Drawings for tray sizes.
 3. GS-Metals “FlexTray” series; refer to Drawings for tray sizes.
 4. Or equal.

2.02 CABLE HANGERS (“J-HOOKS”)

- A. Application: Suitable for indoor installation within ceiling space for the support of communications cables.
- B. Manufacturer:
1. B-Line:
 - a. #BCH21 (or variation per installation method); hanger for up to 40 cables.
 - b. #BCH32 (or variation per installation method); hanger for up to 90 cables.
 2. Erico:
 - a. #CAT12 (or variation per installation method); hanger for up to 16 cables.
 - b. #CAT21 (or variation per installation method); hanger for up to 50 cables.
 - c. #CAT32 (or variation per installation method); hanger for up to 80 cables.
 3. Or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with the Execution requirements of Section 16700.

3.02 EXAMINATION

- A. Examine areas to receive overhead hanger/support system prior to the start of work within this section. Notify the General Contractor of conditions that would adversely affect the installation, or subsequent utilization, of the system. Do not proceed with installation until unsatisfactory conditions are corrected.

3.03 INSTALLATION

- A. Install pathway components in accordance with recognized industry practices, to ensure that the installed system complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
- B. Cable Basket Support:
 - 1. Install support devices (e.g., brackets and threaded rod with strut) per the manufacturer's instructions and fastened to the wall or ceiling using appropriate fasteners.
 - 2. Interface With Other Work: Coordinate the installation of the cable basket with other trades. Trapeze supports and 'hanger rods' ("all-thread"), for example, may be shared to lower overall construction cost.
- C. Cable Hangers:
 - 1. Provide dedicated supports at a maximum sixty inches (60") of separation per a given route. Supports shall consist of #12 wire or one quarter inch threaded rod. Suspend wire, or rod, using components appropriate for the structure – e.g., powder-actuated clip fastener for wire, beam flange clip or angled flange clip for either wire or rod, or an embedded anchor for the threaded rod. Do not share support (wire/rod) with other trades. Do not support the hanger on ceiling grid support wires. Do not support the hanger from ductwork, piping, or other equipment hangers.
 - 2. Provide a cable hanger within 24 inches of downward and/or upward transition.
 - 3. Install hangers a minimum of six inches (6") from light fixtures, or other EMI sources. Install hangers between six inches (6") and twelve inches (12") above ceiling grid.

END OF SECTION 16708

SECTION 16710

TELECOMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Horizontal Cabling (subsystem of Telecommunications Cabling Infrastructure).
- B. Related Sections
 - 1. Comply with the Related Sections paragraph of Section 16700.
- C. Products Furnished and Installed Under Another Section:
 - 1. Conduits for building distribution.
 - 2. Conduit stubs & device (back) boxes for wall mounted outlets.
 - 3. Sleeves.
- D. Products Furnished and Installed by the Owner:
 - 1. Data network switch/router.
 - 2. Telephones.

1.03 REFERENCES

- A. Comply with the References requirements of Section 16700.

1.04 DEFINITIONS

- A. Refer to Section 16700 for Definitions.
- B. In addition, the following list of terms as used in this specification shall be defined as follows:
 - 1. "CAT3": Category 3 [UTP].
 - 2. "CAT5E": Category 5 Enhanced [UTP].
 - 3. "CAT6": Category 6 [UTP].
 - 4. "Channel": End to end transmission path ; e.g., the entire portion of the horizontal cabling to each outlet consisting of the Permanent Link, line cord (at the workstation), patch cord, and, if a full crossconnection is implemented, the crossconnect termination/connecting apparatus and equipment cord.
 - 5. "CMP": Communications Media Plenum, plenum rating; synonymous with "MPP."
 - 6. "CMR": Communications Media Riser, non-plenum riser rating; synonymous with "MPR."
 - 7. "FEP": Fluorinated Ethylene Propylene.

8. "MM": Multimode [fiber type].
9. "PVC": PolyVinyl Chloride.
10. "Permanent Link": Test configuration for a horizontal cabling link excluding test cords, connections at the ends of the test cords, patch cords, equipment cords, line cords; e.g., the 'permanent' portion of the horizontal cabling to each outlet consisting of cable, consolidation point (if used), termination/connecting apparatus in the IDF and the connector at the outlet.
11. "SM": Singlemode [fiber type].
12. "UTP": Unshielded Twisted Pair.

1.05 SYSTEM DESCRIPTION

A. Work Covered Under Other Sections:

1. Telecommunications Rooms:
 - a. Refer to the Drawings for room fit up.
2. Telecommunications Pathways:
 - a. Refer to the Drawings for size (capacity) and route information for pathway system components.
 - b. The cable tray in the BDFs/IDFs exiting into the workspace is covered under another section.
 - c. The pathway system components (cable basket, cable hangers) to the device location is covered under another section.
 - d. The conduit stubs and device boxes at the wall and in-floor outlets are covered under another section.

B. Base Bid Work:

1. Provide engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working telecommunications Horizontal Cabling System installation described in these specifications. Consider horizontal cabling as shown on Drawings as base bid work, unless otherwise noted. This includes terminations at both ends.
2. In general, the base bid work includes:
 - a. Submittals.
 - b. Termination enclosure
 - c. Horizontal cables, terminations, and outlets.
 - d. Cable management.
 - e. Patch cords and cross-connects.
 - f. Cable identification tags and system labeling.
 - g. Record Documents.
 - h. Warranty.

1.06 SUBMITTALS

- A. Comply with the Submittals article of Section 16700 for procedural, quantity, and format requirements.

B. Submittal Requirements at Start Of Construction:

1. Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.
2. Sample Submittal, consisting of the following components:
 - a. Type "A" Outlet Sample - A fully configured outlet including faceplate, modular jacks, and label.
 - b. Cable Label Sample.
3. Schedule Submittal, consisting of proposed schedule of work. This schedule may be combined with the schedule developed for 167xx series Sections.
4. Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations.

C. Submittal Requirements at Closeout:

1. Record Drawings.
2. Crossconnection records/cut sheets.
3. O & M Manuals.

1.07 QUALITY ASSURANCE

A. Comply with the Quality Assurance requirements of Section 16700.

B. Contractor Qualifications:

1. In addition to the Contractor Qualifications requirements of Section 16700, the Contractor shall be manufacturer certified to install the proposed and submitted cabling system and to provide an extended warranty. Provide satisfactory evidence of certification in the form of a current letter or certificate from the manufacturer as part of the bid submission.

1.08 DELIVERY, STORAGE AND HANDLING

A. Comply with the Delivery, Storage and Handling requirements of Section 16700.

1.09 WARRANTY

A. Comply with the Warranty requirements of Section 16700.

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLE - PLENUM RATED

A. CAT6 UTP 4-Pair Cable:

1. Application: Suitable for indoor installation, above ceiling.
2. Conductors:
 - a. Insulated Conductors: 23 AWG solid copper, fully insulated with a flame retardant thermoplastic material (material = PVC, or equivalent).
 - b. Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted

pair), and individually color coded to industry standards (ANSI/ICEA Publication S-80-576-1994, and EIA-230).

3. Cable Sheath:
 - a. The cable shall have a seamless outer jacket (material = LS-PVC, or equivalent) applied to and completely cover the internal components (twisted pairs). The cable shall be unshielded.
 - b. Flame Rating: NEC (Article 800) rated as CMP, and UL listed as such.
4. Electrical Performance: Meet or exceed TIA/EIA-568-B.2-1 and ISO/IEC 11801 requirements for CAT6 UTP cabling.
5. Manufacturer, or equal:
 - a. SYSTIMAX 2071 series cables.
 - b. Belden 7882A series cables.
 - c. BerkTek 2307xx series cables.
 - d. Commscope 7504 series cable

2.02 PATCH CORDS AND CROSSCONNECT WIRE

A. Modular Patch Cords - Type: Data CAT6:

1. Modular patch cords shall be suitable for indoor installation within a telecom room or workstation environment. Cords shall be assembled from a single, continuous length of cordage, homogenous in nature, and shall be terminated at both ends via 8 position modular plugs. Splices are not permitted anywhere.
2. Cordage:
 - a. Insulated Conductors: 24 AWG stranded copper, fully insulated with a flame retardant thermoplastic material (such as PVC, or equivalent).
 - b. Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted pair), and individually color coded.
 - c. Sheath shall be unshielded, and shall be flame-retardant polyvinyl chloride (PVC) jacketed.
 - d. Flame Rating: NEC CM (or higher) rated, and UL listed as such.
3. Electrical Performance: Comply with TIA/EIA-568-B for CAT6 UTP patch cords and Channel requirements (minimum).
4. Manufacturer, or equal:
 - a. SYSTIMAX D8CM series patch cords.
 - b. Panduit #UTPCH7
5. No allowance for furnishing or installing cords for use at the workstations (from the outlet to the end user equipment) will be required for this contract. The Owner will provide these cords.

B. Voice Crossconnect Wire:

1. Suitable for indoor installation within a 110-based crossconnect system. Each and every crossconnect wire shall be manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere.
2. Factory splices of insulated conductors are expressly prohibited.

3. Conductors:
 - a. Insulated Conductors: Conductors shall be 24 AWG solid copper. Conductors shall be fully insulated with a flame retardant thermoplastic material (such as PVC, or equivalent).
 - b. Twisted Pairs: Two insulated conductors shall be "twisted" into a "pair" (twisted pair). Twisted pairs shall be individually color coded.
4. Manufacturer, or equal:
 - a. SYSTIMAX #CCW-F 1/24 S1000 (105 597 231) crossconnect wire, 1 pair, Whi-Red / Red-Whi.
 - b. SYSTIMAX #CCW-F 1/24 S1000 (105 597 264) crossconnect wire, 1 pair, Whi-Blu / Blu-Whi.

2.03 TERMINATION EQUIPMENT

A. Voice Cabling Termination Block, In IDF Rooms:

1. Application: suitable for indoor installation, within telecommunications room for the termination of the horizontal UTP cables.
2. Each termination block shall be 110 type, and have a 72 cable capacity. The blocks shall be vertically oriented for a wall mounted column configuration.
3. The termination blocks shall be accompanied by the appropriate quantity of management panels, for horizontal and vertical routing of crossconnect wires.
4. The termination blocks, with the management panels, shall be capable of supporting, organizing, labeling and patching/ crossconnecting the station cables (as planned).
5. Manufacturer, or equal:
 - a. SYSTIMAX #110PB2-300FT (107 058 810); 110 block, 300 pair/72 cables.
 - b. SYSTIMAX #188D3 (107 151 193); vertical management panel.

B. Data Cabling Modular Patch Panel, In IDF Rooms:

1. Application: Suitable for indoor installation, within telecommunications room.
2. Data CAT6 modular patch panels shall be suitable for installation within a telecommunication facility for the termination of the Station CAT6 UTP cables.
3. The patch panel shall have 110-type termination for the station cables, and shall have 48 ports each. Each port shall be a CAT6 8 position modular jack, T568A wired.
4. The patch panels shall be horizontally oriented for a rack mounted configuration.
5. The patch panels shall be capable of supporting, organizing, labeling and patching/ crossconnecting between the horizontal termination field and the equipment termination field.
6. Manufacturer, or equal: SYSTIMAX #1100GS3-48 (700 173 768); "GigaSpeed" CAT6 modular patch panel, 48 ports.

2.04 CONNECTORS

A. Modular Connectors - CAT6 Cabling:

1. Application: Suitable for indoor installation, at a workstation area.
2. CAT6 UTP 4-pair cables shall be terminated at the workstation via 8 position

- modular connectors. Each connector shall be CAT6 rated.
- 3. Jacks shall be T568A wired.
- 4. Manufacturer, or equal:
 - a. SYSTIMAX "GigaSpeed" series modular connectors
 - b. Panduit "Giga-Channel Mini-Jack" series modular connectors

2.05 WORKSTATION OUTLETS

A. Flush Mount Outlets - Standard Faceplates:

- 1. Application: Suitable for indoor installation, at a workstation area.
- 2. Faceplates shall include required accessories, such as icons, blank inserts, labels and label windows
- 3. Manufacturer, or equal:
 - a. SYSTIMAX "M-Series" faceplate with labels.
 - b. Panduit "Executive Series" faceplate with labels

B. Flush Mount Outlets - Standard Wall Phone Faceplates.

- 1. Wall phone faceplates shall come equipped with 1 modular jack and two mounting studs.
- 2. Manufacturer, or equal:
 - a. SYSTIMAX #M10LW series wall phone faceplate.
 - b. Panduit #KWP6P wall phone faceplate.

2.06 LABELS

A. General: Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer.

B. Horizontal Cable Labels:

- 1. Labels shall be adhesive backed and have a self-laminating feature.
- 2. Labels shall fit the horizontal cables listed above (i.e., shall fully wrap around the cable's jacket).
- 3. Printable Area shall be 2" x 0.5", minimum, in size, and shall be white in color.
- 4. Manufacturer, or equal: Panduit #LJSL7-Y3-1; laser/ink jet labels for cable diameters 0.16"-0.32", white.

C. Modular Patch Panels

- 1. Labels shall be adhesive backed.
- 2. Labels shall fit above the port without overlap to the next port or to the port itself.
- 3. Printable Area shall be 0.61" x 0.33", minimum, in size, and shall be white in color.
- 4. Manufacturer, or equal: Panduit #CPPLF-5; laser labels for modular patch panels, white.

D. 110 Termination Block Labels:

- 1. Color: Blue for horizontal termination field.

2. Manufacturers, or equal:
 - a. SYSTIMAX #110BB2-4500L (106 657 174); label inserts, blue.
 - b. Panduit #DSL110-BU; label inserts, blue.

2.07 MISCELLANEOUS COMPONENTS

A. Velcro Cable Ties:

1. Width: .75".
2. Color: Velcro cable ties shall be the same color as the cable to which it is being applied.
3. Manufacturer: Panduit #HLS-15R-0 Black, 15' roll, cut to length, or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with the General Execution requirements of Section 16700.

3.02 INSTALLATION

A. Equipment Enclosure:

1. Provide parts and accessories required to complete each cabinet.
2. Provide anchors appropriate for the mounting substrate. Structural engineer shall approve anchors.
3. Tolerances:
 - a. Install equipment cabinet to height shown on the Drawings. If not shown, install such that the top of the cabinet is +5'-6" AFF.

B. Horizontal Cable:

1. General:
 - a. Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
2. Installation:
 - a. Maintain a minimum bend radius of 6 times the cable diameter during and after installation.
 - b. Maintain pulling tension within manufacturer's limits.
 - c. Protect cable during installation. Replace cable if damaged during installation.
 - d. Place cables with no kinks, twists, or impact damage to the sheath.
3. Routing:
 - a. Maintain maximum cable length of 90 meters from the termination in the IDF to the termination at the user's faceplate.
 - b. When routing horizontally within telecom rooms, utilize the overhead cable

tray/runway. When routing vertically within telecom rooms, utilize the wall mounted vertical cable runway and support every 24 inches on center using cable ties.

- c. Place and suspend cables in a manner to protect them from physical interference or damage.
- d. Route cables a minimum of 6" away from power sources to reduce interference from EMI.
- e. When routing cables in areas without cable tray/runway, support cables every 5 feet on center utilizing cable hangers.
- f. Provide dedicated supports for cable hangers (e.g., do not clip hanger to existing ceiling support wire).
- g. Route station cable homeruns at 90-degree angles, allowing for bending radius, along corridors for ease of access. Do not route through an adjacent space if a corridor borders at least one wall of the room.

4. Slack:

- a. In the Telecommunications Rooms, provide a 10 feet (minimum) sheathed cable slack loop at each end of the run. Place the slack in the overhead cable tray/runway. At the workstation, place cable in ceiling space supported from a cable hanger.
- b. At the workstation, provide a 10 feet (minimum) sheathed cable slack loop at each end of the run. Place the slack in the ceiling space supported from a cable hanger.
- c. Within the device, provide six inches (minimum) of sheathed cable slack behind each workstation outlet faceplate. The slack cable shall be coiled inside the raceway, within the wall, or in the junction box (if used), per the cabling manufacturer's installation standards.

5. Termination:

- a. At the equipment bay in the Telecommunications Room, divide horizontal cables equally between both sides of an equipment rack such that a cable does not travel past the midpoint of the rack prior to termination.
- b. Properly strain relieve cables at termination points per manufacturer's instructions.
- c. Terminate copper pairs at both ends on the specified connecting hardware.
- d. Perform terminations in accordance with manufacturer's instructions and TIA/EIA-568-B standard installation practices.
- e. Perform post-installation testing as described in the Telecommunication Testing specification.

C. Outlet Faceplates:

1. Mount faceplates plumb, square, and at the same level as adjacent device faceplates.
2. Patch gaps around faceplates so that faceplate covers the entire opening.

D. Outlet Modular Connectors:

1. Terminate pairs of the voice and data cables onto the connector. Terminations shall conform to manufacturer's latest wiring requirements for connector.
2. Replace terminations and connectors not passing the required media test.

E. Termination Block for Voice Station Cabling:

1. Provide accessories required for a complete installation.
2. Install the termination blocks such that the bottom row of terminations is at a height as shown on the drawing. If no height is shown, install at 24" AFF (+/- 3").
3. Mount blocks plumb and square.

F. Modular Patch Panels for Data Station Cabling:

1. Provide modular patch panels in a quantity to allow termination of data cables served from respective IDF. Install into rack bays as shown on Drawings.
2. Mount the modular patch panels in association with the horizontal management panels such that a management panel is mounted above and below given modular patch panel. The 'middle' management panels will be shared between the modular patch panels above and below given management panel. The result will be an "N + 1" configuration.
3. Assemble and install according to the manufacturer's instructions.

G. Data Patching:

1. In IDFs and SDF, provide one data CAT6 modular patch cord per data link from of the horizontal data termination field to the data network switch. Utilize the horizontal and vertical management components to properly route the patch cord.

H. Voice 'Patching' (Crossconnects):

1. In IDFs, provide one 1-pair crossconnect to length from pair #1 per voice link of the horizontal voice termination field to an available pair on the backbone voice termination field. Record crossconnections for MDF crossconnection purposes and for record documents. Utilize the horizontal and vertical management components to properly route the crossconnect wire.
2. Color:
 - a. For digital handsets, provide: White-Blue / Blue-White.
 - b. For analog handsets, provide: White-Red / Red-White.
3. Splices in crossconnect wire are prohibited.

3.03 LABELING

A. General Requirements:

1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner's Representative before installation.
2. Labels shall be permanent with machine-generated text; hand written labels will not be accepted.

B. Label Formats:

1. Horizontal Cable Labels:
 - a. Text Attributes: Black, 1/8" high, minimum, or #12 font size.
 - b. Install labels on both ends of cables no more than 4" from the edge of the

cable jacket. Install labels such that they are visible by a technician from a normal stance.

2. Modular Patch Panel Labels:

- a. Use modular patch panel labels included in the product packaging. Request approval by the Engineer for other labels.
- b. Use a label color for the respective field type, per TIA/EIA-606.
- c. Text Attributes: Black, 3/32" high, minimum, or #10 font size.

3. 110 Termination Block Labels:

- a. Use 110 Termination block labels included in the product packaging. Request approval by the Engineer for other labels.
- b. Use a label color for the respective field type, per TIA/EIA-606.
- c. Text Attributes: Black, 3/32" high, minimum, or #10 font size.

4. Outlet Labels:

- a. Use outlet labels included in the product packaging. Request approval by the Engineer for other labels.
- b. Label Background: White.
- c. Text Attributes: Black, 1/8" high, minimum, or #12 font size.
- d. Install label in the top label window. The bottom label window shall be left blank.

C. Identifier Assignment:

1. General: Separate label fields of the identifier with a hyphen.

2. Horizontal Cables:

- a. First field: the originating MDF/IDF room identity; for example: "O1.1".
- b. Second field: the destination room number; for example: "207".
- c. Third field: the cable's intended service type followed by a unique sequential number; for example: "V1" (voice, cable #1) or "D2" (data, cable #2).
- d. Fourth field: the cable type; for example: "CAT6".
- e. Example: "O1.1-207-D2-CAT6".

3. Outlets:

- a. First field: originating MDF/IDF/SDF room identity; for example: "O1.1".
- b. Second field: destination room number; for example: "207".
- c. Third field: a unique sequential number; for example: "01".
- d. Example: "O1.1-207-01"

4. Individual Ports at the Outlets:

- a. Though the faceplate may have individual port numbers molded into the product, provide port labels as follows.
- b. First field: the cable's intended service type followed by a unique sequential number; for example: "V1" (voice, cable #1) or "D2" (data, cable #2).

5. Individual Termination Positions at the 110 Termination Blocks:
 - a. First field: the End User Room Number; for example: "207".
 - b. Second field: the cable's intended service type followed by a unique sequential number; for example: "V1" (voice, cable #1).
 - c. Example: "207-V1."

6. Individual Ports at the Modular Patch Panels:
 - a. First field: the End User Room Number; for example: "207".
 - b. Second field: the cable's intended service type - for example: "D" (data), and a unique sequential number - for example: "2".
 - c. Example: "207-D2."

3.04 FINAL INSPECTION

- A. Inspect installed products and work in conjunction with the Owner or Owner's Representative. Develop a punchlist for items needing correction.
- B. Issue punchlist to Engineer for review prior to performing punchlist with the Engineer.
- C. Repair defects prior to system acceptance.
- D. Inspect installed products and work in conjunction with the Engineer for sign off.

END OF SECTION 16710

SECTION 16719

TELECOMMUNICATIONS TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SCOPE OF WORK

- A. Section Includes: Testing of Telecommunications Horizontal Cabling subsystem.
- B. Related Sections:
 - 1. Consult all other Sections and Divisions, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to completely test a complete and operable system.
 - 2. Section 16700 - Basic Telecommunications Requirements
 - 3. Section 16710 - Telecommunications Horizontal Cabling
- C. Products Furnished and Installed Under Another Section:
 - 1. Horizontal Cabling System.

1.03 REFERENCES

- A. Comply with Section 16700 References requirements.

1.04 DEFINITIONS

- A. Refer to Definitions of Sections 16700 and 16710.
- B. In addition, the following list of terms as used in this specification shall be defined as follows:
 - 1. "Adapter" (associated with fiber connectivity): Shall mean a connecting device joining 2 fiber connectors, either like or unlike.
 - 2. "Channel": Shall mean a testing configuration which includes the Permanent Link and the line cord (at the workstation), the equipment cord, and, if a full crossconnection is implemented, a patch cord and the crossconnect termination/connecting apparatus.
 - 3. "Connect": Shall mean install all required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
 - 4. "Cord": Shall mean a length of cordage having connectors at each end. The term "Cord" shall be synonymous with the term "Jumper". The cord may be:
 - a. Unshielded twisted pair.
 - b. Fiber (multimode or singlemode), jacketed & buffered.
 - 5. "Permanent Link": Shall mean the 'permanent' portion of the Horizontal cabling to each outlet with the test cords de-embedded from the measurements; this includes

- cable, consolidation point (if used), termination/connecting apparatus in the IDF and the connector at the outlet.
6. "System Cord": Shall mean the cord used in the operating electrical or optical circuit.
 7. "Test Cord": Shall mean the cord certified for use in testing, as described in this section.

1.05 SYSTEM DESCRIPTION

A. Base Bid Work

1. Full testing of a completed communication infrastructure cabling system which includes:
 - a. Equipment and Procedure Submittals.
 - b. Testing of the multipair cabling as follows:

Table 16719-1.2: Tests For UTP Cabling

Subsystem	Type	Test	Configuration	Notes
Horizontal	CAT6	Category 6	Permanent Link	Per TIA/EIA-568-B.2-1

- c. Record Documents, including test results.

1.06 SUBMITTALS

- A. Refer to Submittals of to Section 16700 for procedural, quantity, and format requirements.
- B. Submittal Requirements at Start Of Construction:
 1. Testing Procedures Submittal, describing step by step procedures used by the field technicians.
 2. Product Submittal, including cut sheets of testing equipment to be used (note all software/ firmware versions as applicable).
 3. Schedule Submittal, consisting of proposed schedule of work. This schedule may be combined with the schedule developed for 167xx series Sections.
- C. Submittal Requirements at Closeout:
 1. Record Documents.
- D. Submittal Description: Record Documents.
- E. Record Documents Record Documents shall include Test Reports showing the following information:
 1. A title page which includes:
 - a. Client Name
 - b. Project Name
 - c. Project Address
 - d. Contractor's Name

- e. Date of Submittal
- 2. All Horizontal cable test results, per cable.
- 3. Furnish all test results on CD-ROM in their native data format and an exported Microsoft Excel compatible format.
 - a. Include all necessary software to allow viewing and printing of individual test results.
 - b. CD shall be labeled with the project name, contractor name, and date of submission.

1.07 QUALITY ASSURANCE

- A. Comply with the Quality Assurance requirements of Section 16700.

1.08 WARRANTY

- A. Warrant the validity of the test results. Under no circumstances shall any cable's test results be substituted for another's. If a single instance of falsification is confirmed, the Contractor shall be liable for a complete retest of the cabling system at no additional cost to the Owner. This includes the retaining the services of a neutral party to observe all retesting.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The manufacturer may change the product numbers listed in this Section at any time. In the event this Section contains an invalid product number or conflicts with the written description, notify the Engineer in writing prior to issuing submittals or field testing.

2.02 CATEGORY 6 HORIZONTAL CABLE TESTER

- A. Equipment shall meet TIA/EIA-568B.2 Addendum 1 requirements for Level III accuracy.
- B. Test Standards (minimum): TIA Category 6 (per TIA/EIA-568B.2 Addendum 1); ISO/IEC 11801 Class C and D; ISO/IEC 11801-2000 Class C and D, 1000Base-T, 100Base-TX; IEEE 802.3 10Base-T; ANSI TP-PMD; IEEE 802.5.
- C. Areas of Test Measurement (minimum): Wire Map; Length; Insertion Loss; Near End Crosstalk (NEXT) loss, at both master unit and remote unit; Power Sum NEXT (PSNEXT) loss, at both master unit and remote unit; Equal Level Far End Crosstalk (ELFEXT), at both master unit and remote unit; Power Sum ELFEXT, at both master unit and remote unit; Return Loss (RL), at both master unit and remote unit; Propagation Delay and Delay Skew; Attenuation-to-Crosstalk Ratio (ACR), at both master unit and remote unit; Power Sum ACR (PSACR), at both master unit and remote unit; Characteristic Impedance; DC Loop Resistance.
- D. Equipment: Agilent Technologies:
 - 1. #N2600A-100; "WireScope 350" test kit (main unit, remote unit, CAT6

- permanent link probe, CAT6 channel probe, accessories), loaded with the latest version of firmware.
- 2. "ScopeData Pro" reporting and documentation software latest version.

E. Equipment: Fluke Networks:

- 1. #DSP-4300; "CableAnalyzer" test kit (main unit, remote unit, CAT6 permanent link adapters, CAT6 channel adapters, accessories), loaded with the latest version of firmware.
- 2. "LinkWare" reporting and documentation latest software

PART 3 - EXECUTION

3.01 SCHEDULING

- A. Prepare a schedule based on the schedule developed for Sections 167xx for the testing activities. Prepare updated schedules when changes in the schedule occur.

3.02 FIELD QUALITY CONTROL

- A. Complete testing as delineated below prior to system acceptance.
- B. Permanently record all test results and presented in a format acceptable to the Owner or Engineer before system acceptance.
- C. Remove and replace with new, at no cost to the Owner, any cables or conductors (copper or glass) failing to meet the indicated standards. The Owner will not accept the installation until testing has indicated a 100% availability of all cables and conductors or the Owner has approved any deviation from this requirement.
- D. Calibrate test sets and associated equipment per the manufacturers printed instructions at the beginning of each day's testing and after each battery charge. Fully charge the test sets prior to each day's testing to ensure proper operation.

3.03 HORIZONTAL CATEGORY 6 TESTING PROCEDURES

A. Precautions:

- 1. Adhere to the equipment manufacturer's instructions during all testing.
- 2. Prior to any testing activity or any measurements taken, ensure the test equipment is at room temperature - approximately 70 degrees F (e.g., if necessary, bring the test equipment in from outdoors and let it set for about 15 minutes or for however long it takes to bring the test equipment to reach room temp).
- 3. Fully charge power sources before each day's testing activity.

B. Test Equipment Set Up:

- 1. Set up the tester to perform a full Category 6 test, as a Permanent Link configuration.
- 2. If the tester has the capability, set the cable type as product specific setting. If not, set as generic Category 6.
- 3. Set the tester to save the full test results (all test points, graphs, etc.).
- 4. Save the test results with the associated cable link identifier to match that as

- specified in Section 16710.
5. Calibrate the test set per the manufacturers instructions.

C. Acceptable Test Result Measurements:

1. Overall Test Results:
 - a. Links which report a Fail, Fail* or Pass* for any of the individual tests shall result in an overall link Fail. All individual test results must result in a Pass to achieve an overall Pass.
 - b. Any reconfiguration of link components required as a result of a test Fail, must be re-tested for conformance.
 - c. Any cabling links failing to meet the criteria described in this specification shall be removed and replaced, at no cost to the Owner, with cables that prove, in testing, to meet the minimum requirements.
2. Wire Map: All pairs of the cabling link shall be continuous and terminated correctly at both ends. No exceptions shall be accepted.
3. Length: The maximum acceptable electrical length measurements for any cabling link measured under a Permanent Link configuration shall be 94 meters, including test cords.
4. Insertion Loss: The acceptable insertion loss measurements for any Category 6 cabling link shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
5. Worst Pair-to-Pair Near End CrossTalk (NEXT) Loss: The acceptable worst pair-to-pair NEXT loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
6. Power Sum NEXT Loss: The acceptable power sum PS-NEXT loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
7. Worst Pair-to-Pair ELFEXT and FEXT Loss: The acceptable worst pair-to-pair ELFEXT and loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
8. Power Sum ELFEXT and FEXT Loss: The acceptable PS-ELFEXT and loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
9. Return Loss: The acceptable return loss measurements for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
10. Propagation Delay and Delay Skew: The acceptable propagation delay and delay skew measurements for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.

3.04 RECORDS

- A. Permanently record all test results. Submit test results in a format acceptable to the Owner or Engineer before system acceptance.
- B. Submit this information at the conclusion of the testing to the Engineer for approval.
- C. Include approved test reports in final record documents submittal.
- D. For each Horizontal test, record the following information:
 1. Project name and address.

2. Contractor's name.
3. Date of measurement.
4. Test equipment, including the following:
 - a. Manufacturer, model, and serial number
 - b. Date and time of last calibration.
5. Operator's name(s).
6. Identification number of cable.
7. Overall test result.

END OF SECTION 16719

SECTION 16720

FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This section includes furnishing, installation, and connection of the microprocessor-controlled fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, and power supplies specified herein.
- B. The fire alarm system shall comply with requirements of this section and NFPA Standard No. 72 for protected premises signaling systems. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
- C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-Current Edition.
- D. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians for all installation, programming and final check-out.

1.03 RELATED SECTIONS

- A. Section 01330 - Submittal Procedures

1.04 REFERENCES

- A. NFPA 72 - (1999 Edition with CA Amendments) National Fire Alarm Code.
- B. Uniform Building Code - (2001 Edition with latest California (CA) amendments)
- C. Uniform Fire Code - (2001 Edition with latest CA amendments)
- D. Santa Cruz Fire Department requirements, including but not limited to:
 - 1. The Santa Cruz Fire Department does not allow installation of Fire alarm Systems prior to the separate Fire Department permit approval. Contractors who engage in such activities may be cited and the project will be "Red Tagged".
 - 2. All Fire Alarm Systems require separate plans, application, review, permit and fee. The specifications are to be used for bid purposes only and shall not construe Fire Department Approval. A minimum of two sets of plans shall be submitted and shall be wet stamped and signed by the person responsible for designing the system. The Fire Department permit needs to be issued to the installing contractor, who will be responsible for requesting all inspections.
 - 3. Fire Alarm plans shall be sent to: Santa Cruz Fire Department Fire prevention Bureau, 230 Walnut Street, Santa Cruz, Ca 95060.

4. The Fire Alarm System is required due to 100 or more sprinkler heads per CBC 904.3, UFC 1003.3.
5. The following components are required for monitoring flow on sprinkler systems with over 100 heads installed per CBC 904.3 & UFC 1003.3 & NFPA 72:
 - a. Monitoring per CFC 1007.3.3.6, CFC 1003.3 (remote or central station)
 - b. Automatic smoke detection at control unit (alarm panel) when located in an area that is not continuously occupied (24/365). NFPA Section 1-5.6
 - c. Smoke detection recall for elevators when required by CBC section 3003.2 and NFPA section 1-5.6 installed per CBC and NFPA 72.
 - d. Duct detectors when required by UMC section 608 when units exceed 2000 CFM.
 - e. One pull station required at main exit from building per NFPA 72, section 3-8.1.2.
 - f. Horn/Strobe devices to be provided which satisfactorily meet the intent of CFC 1003.3.2. Examples: A minimum of one per floor in multi story buildings, or one per tenant space in a multi tenant strip mall. Where the majority of the occupants can hear or see the alarm.
 - g. Temporal 3 notification pattern is required per NFPA 72, section 3-7.2
 - h. When two or more audible appliances can be heard, synchronization is required to maintain temporal pattern 3.
 - i. Audibility and visibility of notification appliances will be field verified at the time of acceptance testing to ensure they are located per sections listed above.
 - j. Detector in shaft per NFPA 72, section 5-1.3.4. Shaft construction to accommodate for heat detector maintenance.
 - k. Heat detector in shaft only for required fire alarm systems per NFPA 72, section 5-2.2.
6. Fire Alarm System and all components shall conform to NFPA72 minimum standards and shall be reviewed and approved by the Fire Department PRIOR to installation. Stamped approved plans shall be kept on site for the review of the fire inspector.
 - a. Fire Alarm Contractor shall provide a complete submittal to the Fire Department.
 - b. Completed packet shall be included with all Fire Alarm plan submittal.
7. The Fire Alarm system shall be monitored by a remote station.
8. Duct Detector required in the air supply when the aggregate of units exceed 2000 CFM per UMC, section 608 and NFPA 72, section 5-11.4.2. Duct detectors shall be installed per NFPA 90A. Detectors shall be supervised when a fire alarm system is installed in the premises.

1.05 SCOPE

- A. A new microprocessor controlled fire detection and alarm system shall be installed in accordance with this specification. The system(s) shall provide detection and annunciation per the requirements of the codes listed in Section 1.3 above including monitoring of all sprinkler systems and elevator recall as required.
- B. Basic Performance:
 1. Initiating Device Circuits (IDC) shall be wired Class B (NFPA Style B).
 2. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y).

1.06 SUBMITTALS

A. Submittals shall be in accordance with 01330 - Submittal Procedures

B. Submittals Shall Include:

1. Complete descriptive data (cut sheets and installation, operation and maintenance, manuals) in order of FACP, NAC, INITIATING, NOTIFICATION, AND OTHER EQUIPMENT.
2. Complete system wiring connection diagrams, wiring connection details (shop drawings).
3. Show floor plans point to point wiring indicating the number, the gauge of the conductors and the size of conduit/raceway used.
4. Show a detailed riser diagram.
5. Show wiring connection details for components being connected to the system and interface to associated equipment.
6. Provide control panel layout, battery current calculations, voltage drop calculations (for each signaling circuit and any other 24 volt powered circuit, indicating conductor run length and wire size). 10 percent voltage drop maximum.
7. Show on floor plans symbol key with device catalog number, description, back box size and mounting requirements.
8. Matrix of sequence of operation.
9. Indicate system components, and location.
10. Show wire schedule include make, type, and size, of wire.
11. Include manufacturer's name, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
12. Show on floor plans conduit runs, point-to-point wiring of all devices and related equipment. Show wiring to fire doors, HVAC shutdown, fan control, damper control, and other controlled systems and equipment, not listed.
13. Show point-to-point wiring of all sprinkler tamper and flow switches.
14. Show on drawing location of all junction boxes.
15. Show detailed control panel layout. Include all power, notification and IDC circuits. Include power extenders.

C. Manuals:

1. Provide operation and maintenance manuals in quantities and format as specified in Section 01330 - Submittal Procedures. Submit simultaneously with the shop drawings, complete preliminary operating and maintenance manuals listing the manufacturer's name(s) including technical data sheets (with model numbers to be used indicated).

D. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.07 WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.08 PERFORMANCE CRITERIA / APPLICABLE PUBLICATIONS

- A. The publications and/or standards listed below form a part of this specification. The publications are referenced in text by the basic designation only.
 - 1. The system and its components shall be Underwriters Laboratories, Inc. Listed under the appropriate UL testing standard for fire alarm applications and shall be installed in compliance with the UL listing.
 - 2. Codes listed in 1.3 above.
 - 3. All requirements of the Authority Having Jurisdiction (AHJ).

1.09 BATTERIES

- A. Shall be sealed, Gel-Cell acid type.
- B. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
- C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.
- D. If necessary to meet standby requirements, external battery and charger systems may be used.

1.10 SYSTEM COMPONENTS

- A. A Digital Alarm Communicator Transmitter (DACT) shall be included in or with the panel. The DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station.
 - 1. The DACT shall be fully integrated into the control panel or mounted adjacent to the panel
 - 2. The DACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to three different telephone numbers.
 - 3. The DACT shall be programmed through a keypad . The DACT shall also have the ability with an optional programming kit, to upload and download programming from a PC.
 - 4. The DACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.
 - 5. Communication shall include vital system status such as:
 - a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
 - b. AC (Mains) Power Loss
 - c. Low Battery and Earth Fault
 - d. System Off Normal
 - e. 12 and 24 Hour Test Signal

- f. Abnormal Test Signal (per UL requirements)
 - g. Phone Line Failure
6. The DACT shall support independent zone/point reporting when used in the Contact ID format. This enables the central station to have exact details concerning the origin of the fire or response emergency.
- B. Enclosure:
- 1. The control panel shall be housed in a cabinet suitable for surface or flush mounting.
- C. Power Supply:
- 1. The Main Power Supply for the Fire Alarm Control Panel shall provide all control panel and peripheral device power needs, as well as 3.0 amperes of 24 VDC power for each NAC.
 - 2. The power supply shall provide an integral battery charger for use with batteries with up to 60 hours of standby power.
- D. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
- 1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.
 - 2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
 - 3. The FCPS shall include an attractive surface mount backbox.
 - 4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per 1993 NFPA requirements.
 - 5. The FCPS include power limited circuitry, per 1995 UL standards.
- E. Specific System Operations
- 1. Walk Test Operation
 - a. Walk Test mode shall test Initiating Device Circuits and Notification Device Circuits from the field without returning to the panel to reset the system.
 - b. Upon activation of an IDC, all outputs normally activated by the tested zone shall activate for four seconds. Subsequent activation of devices on the same zone will activate outputs for one on second.
 - c. Inducing a trouble into the initiating circuit shall activate the controlled outputs and remain activated until the trouble is cleared.
 - 2. Alarm Verification Operation
 - a. When an alarm condition is detected on an Initiating Device Circuit which has been programmed for Alarm Verification shall cause the panel to remove power to that IDC to reset 2 wire detectors. After a short reset and retard time if that circuit returns within the confirmation time it will cause a verified alarm.

3. Waterflow Operation

- a. All Initiating Device Circuits shall be programmable to provide Waterflow detection. If an alarm occurs on a Waterflow zone, all Notification Appliance Circuits which are programmed to activate for that zone will not be affected by the silence switch.
- b. A programmable retard timer shall be available for waterflow circuits. This timer shall allow retards for 1-89 seconds.

4. Supervisory Operation:

- a. An alarm on a Supervisory circuit shall activate all programmed (mapped) outputs, activate a common Supervisory LED, and activate the zone which is in alarm.

5. Signal Silence Operation:

- a. All Notification Appliance Circuits of the system shall be capable of being programmed to deactivate with depression of the Signal Silence switch.

F. Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
3. Shall be flush or surface mounted as show on plans.

G. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.
2. Strobe intensity shall meet the requirements of UL 1971.
3. The flash rate shall meet the requirements of UL 1971.

H. Duct Smoke Detectors:

1. Duct smoke detectors shall be a 120 VAC/24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air ducts(s), with properly sized air sampling tubes.

I. Waterflow Switches:

1. Waterflow switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
2. Waterflow switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
3. All waterflow switches shall come from a single manufacturer and series.
4. Waterflow switches shall be connected under this section but provided and installed by the mechanical contractor.

J. Sprinkler and Standpipe Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4-inch conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The switch housing shall be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof.
7. Valve supervisory switches shall be connected under this section and provided and installed by mechanical contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Notifier
- B. Seimens
- C. EST
- D. Or Approved equal

2.02 MATERIALS

- A. Wiring:
 1. All Fire Alarm Cable shall be UL listed for fire alarm applications.
 2. All Fire Alarm cabling in areas without ceilings shall be installed in EMT or Rigid conduit. EMT/conduit shall be labeled to identify the EMT/conduit as containing fire alarm wiring.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with the codes listed in Section 1.3 above and as recommended by the equipment manufacturer.
- B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.

- C. All fire detection and alarm system devices, and control panels shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. All areas of the Operations Building, except electrical rooms, shall be considered "finished". Office areas of the other building shall be considered "finished".

3.02 TEST

- A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- B. Close each sprinkler system control valve and verify proper supervisory alarm at the FACP.
- C. Verify activation of all flow switches.
- D. Open initiating device circuits and verify that the trouble signal actuates.
- E. Open and short Notification appliance circuits and verify that the trouble signal actuates.
- F. Ground device circuits and verify response of trouble signals.
- G. Check proper operation of all alarm notification devices.
- H. Check installation, supervision, and operation of duct detectors.
- I. Verify that each initiating device alarm signal is properly received and processed by the fire alarm control panel (Walk Test).
- J. Conduct tests to verify trouble indications for common mode failures, such as alternating current power failure.

3.03 FINAL INSPECTION

- A. At the final inspection the installer of the system shall demonstrate that the systems function properly in every respect. The engineer shall be present at the final inspection.

3.04 FIELD QUALITY CONTROL

- A. Upon completion of the installation; subject the system to a complete operational test of all functions, devices and interfaced components and when necessary corrections have been accomplished, advise the Engineer who will schedule a final inspection test with the Owner. Ensure the connections to the fire alarm system have been in service for at least 5 days of trouble/alarm free operation prior to the final inspection. Furnish instruments, labor and materials required for the tests and a qualified technician to conduct the tests. Correct any deficiencies found at no cost and retest system as necessary, prior to final acceptance. The test shall include the following:
 - 1. An operation of each initiating device (smoke detectors, heat detectors, pull stations, process and facilities control sequences).
 - 2. An operation of each notification device (alarm horn and alarm strobe).
 - 3. Operation of all features of the system under normal operation.

4. Operation of all supervisory features of the system.
 5. Test of the systems on standby power after 24 hours with primary power off.
 6. Field inspection of wire terminations, junctions, T-Tapping and labeling.
 7. Testing wires for grounding, opens and shorts.
- B. Upon completion of the installation of fire alarm equipment, provide to Engineer a signed, written statement substantially in the form as follows: "The undersigned having been engaged as the Contractor on the facility confirms that the fire alarm equipment was installed in accordance with the Specifications, wiring diagrams, instructions and directions provided by manufacturer."
- C. Submit prior to final acceptance:
1. A letter confirming that inspections have been completed and the system is installed and functioning in accordance with the Specifications. Include Inspection Form and letter of warranty.
 2. O&M Manuals
 - a. Provide 3 sets of final Operation and Maintenance manuals to the Engineer. The final manuals shall contain; Record Drawings, battery type and battery calculations, spare parts list, operating procedures, trouble shooting guide, program for fire alarm panel and UDACT, program worksheets, data file and AutoCAD 2000 or greater as-builts on compact disk and a 1 year warranty agreement including parts and labor. Contractor to furnish drawings showing all components, device locations, riser diagram (specific to project) conduit runs, J-box locations, device addresses and point to point wiring diagram of fire alarm panel.
- D. The Contractor shall provide an acceptance test plan and form for review prior to testing. The test plan shall be submitted no later than 2 weeks before the test.

3.05 EQUIPMENT DEMONSTRATION AND PERSONNEL TRAINING

- A. At the direction of Engineer the equipment supplier of the system will provide factory-trained representative to demonstrate the operation of the fire alarm system equipment and to instruct the Owner's personnel in its operation. Provide names and date of instruction prior to final acceptance. Provide staff with a minimum of 4 hours of training on two days for a total of 8 hours of training.

END OF SECTION 1672

SECTION 16900

LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Invitation For Bids (IFB) and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Control wiring.
- B. Contactors and relays.
- C. Time switches.
- D. Timer switches.
- E. Photoelectric relay.

1.03 RELATED WORK

- A. Circuit breakers, Section 16050, Basic Materials and Methods.
- B. Momentary contact switches, Section 16050, Basic Materials and Methods.
- C. Occupant sensors, Section 16140 – Wiring Devices

1.04 SUBMITTALS:

- A. Manufacturers literature describing each product.
- B. Shop drawings for the following, drawn by a competent draftsman.
- C. Wiring diagrams including a system diagram distinguishing between factory wiring and field wiring.
- D. Furnish samples upon request of Architect/Engineer.
- E. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
- F. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

PART 2 - PRODUCTS

2.01 CONTACTORS AND RELAYS

- A. ASCO, Zenith, Square D, or equal, with type, number of poles and enclosure as shown on drawings.

2.02 TIME SWITCHES

- A. Maintained Contact Type For Lighting Control: Tork TZ series, Sangamo, Paragon, or equal, three pole switch with carry-over, astronomic dial, and operation as shown on the drawings.
- B. Momentary Contact Type: Tork 1847ZL series, Sangamo, Paragon, or equal, single pole, double throw with astronomic dial, carry-over, and operation as shown on the drawings.
- C. Time Switch With Photocell: Tork T-900 series, Sangamo, Paragon, or equal, with operation as shown on drawings.

2.03 TIMER SWITCHES

- A. M.H. Rhodes "Mark Time" 9000 series, Emerson-Pryne, or equal, spring wound time mechanism with stainless steel plate. Timer shall have 0 to 12 hours timing mechanism and shall time "off".

2.04 PHOTO-ELECTRIC RELAY

- A. Tork 2100 series, Fisher-Pierce, or equal, with adjustable "on" settings.

PART 3 - EXECUTION

3.01 CONTROL WIRING

- A. Provide all conduit, wiring, and outlets for all power wiring and all line voltage and low voltage control wiring.

3.02 INSTALLATION OF TIME SWITCHES

- A. Where indicated on the drawings as surface mounted, provide NEMA 1 enclosure with padlockable hasp.
- B. Where indicated on the drawings as flush mounted, provide NEMA 1B enclosure with hinged door and key lock.

3.03 TESTS

- A. Dimming Systems:
 - 1. Adjust all dimmer module intensity controls to provide uniform dimming of output circuits.

END OF SECTION 16900

**II. BID FORM
Document 1**

carefully read and examined the plans, specifications, and all related bidding documents as prepared by METRO for the construction of the MetroBase Project Phase 1, having carefully and fully examined the sites of the proposed work and all information available to bidder, and being familiar with all the conditions related to the proposed work, including the availability of materials, equipment, and labor, hereby offers to furnish all labor, materials, tools, transportation, services, and equipment necessary to complete the work of the described project in accordance with the IFB, and to complete all requirements of the IFB for the sums quoted in this Bid Form. The bidder agrees that it will not withdraw its bid within sixty (60) days after the bid submission deadline. If the bidder is selected as the apparent lowest responsive responsible bidder, the bidder agrees, within ten (10) working days after receipt of notice of award, to sign and deliver the Contract, and to furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and other required items to the Purchasing Agent at 110 Vernon Street, Suite B, Santa Cruz, California 95060. If awarded the Contract, the bidder agrees to complete the project within 974 calendar days after the date of the commencement specified in the Notice to Proceed.

- 5) The bidder agrees to perform the work for the combined cost of all items of work in the amount of:

FIFTEEN MILLION ONE HUNDRED NINETY Dollars (\$ 15,195,000)
(In words-printed or typed) FIVE THOUSAND

- 6) Bidder represents warrants and agrees that if awarded the contract, bidder shall perform a minimum of 40 (%) of the total of all work with its own forces.

There is herewith enclosed cash, a Bidder's Bond, or bid security for the benefit of, or a certified check or cashier's check made payable to, Santa Cruz Metropolitan Transit District in the amount of:

Bidder's Bond (10%) ----- Dollars (\$ -----)
(In words-printed or typed)

The bidder agrees that if the bidder is selected as the apparent lowest responsive responsible bidder whose bid is responsive, and the bidder fails to sign the Contract and/or furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and/or other required items within the time limit specified in the IFB, the Santa Cruz Metropolitan Transit District may award the work to another bidder or call for new bids. In such event, the bidder shall be liable to the Santa Cruz Metropolitan Transit District for the difference between the amount of the disqualified bid and the larger amount for which the Santa Cruz Metropolitan Transit District procures the work plus all of the Santa Cruz Metropolitan Transit District's costs, damages, expenses and liabilities arising from bidder's failure to sign the Contract and/or furnish the required documents.

BIDDER IS A: (circle one)

Corporation Partnership Individual Joint Venture Other _____

Federal Tax Number: 68-0250401

Business License Number: 626859

What is the official name registered with the IRS for this number?

West Bay Builders, Inc.

When were you organized? 1989

If a Corporation, where incorporated? California

How many years have you been in the contracting business under your current firm name or trade name? 17

**II. BID FORM
Document 1**

State the date bidder first began business 7/1/89

State any other names that bidder has used or done business under in the past five (5) years.

N/A

NAMES AND TITLES OF KEY MEMBERS OF FIRM: Paul Thompson - President, Secretary,
Treasurer / Joe Hass - Vice President

(Name of person signing the bid on behalf of the bidder and all general partners, if a partnership, must be included.)

NAME OF PRESIDENT IF A CORPORATION: Paul Thompson

NAME OF SECRETARY IF A CORPORATION: Paul Thompson

STATE OF INCORPORATION: California

CALIFORNIA CONTRACTOR'S LICENSE(S):

Contractor warrants that it either has the required license as indicated or will possess the required license at the time of the award.

Name of License(s):

<u>A, B, C17</u>	<u>626859</u>	<u>8/31/07</u>
Classification(s)	Number	Expiration Date

(For Joint Ventures, list license or licenses for all Joint Venture partners.)

CORPORATE SEAL:

Identification of contact person during IFB process:

Name: Paul Thompson

Address: 250 Bel Marin Keys Blvd., Bldg. A, Novato, CA 94949

Telephone Number: (415) 456-8972

Fax Number: (415) 459-0665

E-Mail Address: pault@westbaybuilders.com

**II. BID FORM
Document 1**

Acceptance of Terms:

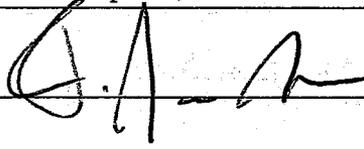
Execution of this Bid Form shall be deemed as acceptance of all the terms and conditions as set forth in the Notice and Invitation of Bids, including but not limited to the Instructions to Bidders (Part I), Bid Form (Part II), General Conditions of Contract (Part III), Special Conditions of Contract (Part IV), Contract (Part V), the FTA Requirements for construction contracts (Part VI), Volumes 2 and 3 of the IFB and the construction drawings.

NAME OF BIDDER'S FIRM:

Address: 250 Bel Marin Keys Boulevard, Building A, Novato, CA 94949

By:  (Signature)

Paul Thompson, President
(Print)

By:  (Signature)

Joe Hass, Vice President
(Print)

(If signature is by other than the sole proprietor, general partner, or corporate officers, attach an original Power of Attorney.)

BID FORM – DOCUMENT 2

**STATEMENT OF BIDDER'S QUALIFICATIONS, EXPERIENCE,
FINANCIAL VIABILITY, AND ABILITY & PROJECT CAPACITY**

(Use Additional Sheets if necessary)

This form must be completed, signed by bidder, and submitted to the Santa Cruz Metropolitan Transit District with the bidder's submitted bid package or no later than 10:00 am on December 15, 2005. Failure to complete, sign and submit this document may result in bidder's submitted bid to be rejected as non-responsive.

The BIDDER is required to state below what work of similar magnitude or character it has completed, and to give a minimum of three (3) references that will enable METRO to judge its experience, skill and business standing and of his/her/its ability to construct the Project as completely and as rapidly as required under the terms of the IFB.

All questions must be answered and the data given must be clear and comprehensive. Provide the nature of the work performed, for whom, amount of contract, dates of work, and the name of architect, engineer, or other supervising person or public agency. **If necessary, questions may be answered on separate attached sheets.** The BIDDER may submit any additional information it believes is relevant to its qualifications and experience.

1. State the full legal name of the bidder.
2. State the name and title of each officer or other legal entity, which has a legal or equitable ownership of ten percent (10%) or more of the bidder. For each such person or legal entity, state that person or entity's ownership interest, and responsibilities, if any.
3. Has any person or legal entity holding a legal or equitable ownership of ten percent (10%) or more of the bidder, ever been accused of a civil violation of California Government Code Section 12650, et seq., (False Claims Act) or 31 United State Code Section 3729, et seq.? If so, describe in detail all facts, circumstances and the outcome.
4. Has any person or legal entity holding a legal or equitable ownership of ten percent (10%) or more of the bidder, ever been determined by a public agency to not be a responsible bidder? If so, state the name, address and telephone number of the public agency, including the name of the agency's contact person.
5. For every lawsuit or arbitration between bidder and the owner of construction project, limited to such lawsuits or arbitrations initiated or completed within the past seven (7) years, state the name and address of the tribunal, the matter number, the parties, a general description of the nature of the dispute, and the outcome, if any.
6. Within the past seven (7) years, has bidder paid liquidated damages, ever failed to complete a construction project, within the time allowed by the contract, including any agreed upon contract extensions? If so, state the name, address and telephone number of the owner of such construction project including the name of the agencies' contact person, and further, describe in detail the nature of the work of improvement.
7. Within the last seven (7) years has any surety of bidder ever paid or satisfied any claim against the bidder? If so, state all facts and circumstances, including the name, address and telephone number of surety and all claimants.
8. Has any surety of bidder ever been called upon to complete a project for the bidder? If so, state all facts and circumstances, including the name, address and telephone number of surety and all claimants.

BID FORM – DOCUMENT 2

STATEMENT OF BIDDER'S QUALIFICATIONS, EXPERIENCE, FINANCIAL VIABILITY, AND ABILITY & PROJECT CAPACITY

1. West Bay Builders, Inc.
2. Paul Thompson – President (100% ownership)
Joe Hass – Vice President (0% ownership)
3. YES, the Santa Cruz City School District has alleged violation of the False Claims Act against WBB. This is a minor dispute in which SCCSD claims WBB failed to include historical information in a pre-qualification statement. This issue is currently in dispute.
4. NO
5. Please see attached...
6. YES, West Bay has paid LDs as detailed in the attachment, but has not failed to complete a construction project. Please see attached...
7. NO
8. NO
9. Please see attached...
10. 2005 – \$95,253,618
2004 - \$104,336,880
2003 - \$74,781,229
2002 - \$60,314,004
2001 - \$53,703,382
11. Please see attached envelope...
12. Please see attached...
13. Please see attached...

BID FORM – DOCUMENT 2

9. For each construction project that bidder is either (a) currently furnishing labor, services, materials or goods, or (b) under contract to furnish labor, services, materials or goods, state: A general description of the project; the current status of the project and bidder's work thereon; the owner's name, address and telephone number; the amount of bidder's contract on such project and the scheduled completion date.
10. State bidder's annual gross income for each of the last five fiscal years.
11. Attach a current financial statement. As used herein, "current financial statement" means a balance sheet and profit and loss statement prepared and presented in a format that complies with Generally Accepted Accounting Principles (GAAP), covering a period of time that is no less than the most recent fiscal year for bidder. The current financial statement must be prepared by a Certified Public Accountant. If bidder's most recent fiscal year ended more than six (6) months prior to the date when the Contract Documents require this Contractor Qualification Questionnaire be completed and returned to Santa Cruz Metropolitan Transit District, then "current financial statement" shall also include an interim balance sheet and profit and loss statement covering the period of time from the end of bidder's most recent fiscal year to a period of time no greater than sixty (60) days prior to the date when the Contract Documents require this Bidder Qualification Questionnaire be completed and returned to Santa Cruz Metropolitan Transit District. Bidder's current financial statement must demonstrate Bidder's financial viability and financial ability to perform this Project and Bidder's other scheduled projects.
12. Describe the Organizational Structure of the proposed Project Team. If the Bidder is a Joint Venture than provide a copy of the Joint Venture agreement. Provide a description on any team agreements, the functions and organizational structure of each team member, including proposed major subcontractors and sub-consultants.
13. At a minimum to be responsible, you must meet the following criteria (Documentation must be attached setting forth the Name of Owner, Address, Contact Person, phone number, e-mail address of each project that Bidder claims meet the owner required criteria so that METRO can verify Bidder's experience.):
 - a. Have completed to the public owner's satisfaction, no less than three (3) public works projects in the State of California involving the construction of a building, each with an original contract price of no less than \$15,550,000.00, within the past seven (7) years, with at least one of the projects successfully completed within the last year prior to the date of bid opening. Each of the Projects must have required substantial work involving the bidder's own forces itself.
 - b. The General Contractor or subcontractor thereof shall have completed to the public owner's satisfaction, at least **two (2) public works** projects in the State of California of similar scope, size, and complexity of this project.
 - c. The proposed Project Manager shall have experience in management of construction, including at least five (5) years experience with significant responsibility on at least two (2) construction projects of similar scope, size, and complexity of this project.

Question 9.

PROJECTS IN PROGRESS

PROJECT	LOCATION	OWNER	DESCRIPTION	TOTAL CONTRACT VALUE	COMPLETION DATE	% COMPLETE
Cinema Place Parking Garage	Hayward	City of Hayward 777 B Street Hayward, CA 94541 (510) 583-4730	New Construction	\$ 6,430,000.00	Jul-07	15
Joseph Lee Recreation Center	San Francisco	City and County of San Francisco 875 Stevenson Street, Room 420 San Francisco, CA 94103 (415) 557-4642	Renovation	\$ 6,455,000.00	Sep-07	23
U.S. Appraisers Building	San Francisco	U.S. Department of GSA 450 Golden Gate Avenue San Francisco, CA 94102 (415) 522-3168	Renovation	\$ 22,611,492.00	Jun-08	10
Downer Elementary School	San Pablo	West Contra Costa Unified School District 1108 Bissell Avenue Richmond, CA (510) 412-5657	New Construction/ Demolition	\$ 21,232,027.00	Aug-08	8
Potrero Heights Reservoir Upgrade and Site Improvement	San Francisco	City and County of San Francisco 1155 Market Street, 9th Floor San Francisco, CA 94103 (415) 748-0487	Renovation/ Seismic	\$ 5,094,156	Feb-07	75
Minnie & Lovie Ward Recreation Center and Ocean View Park	San Francisco	City and County of San Francisco 1680 Mission Street San Francisco, CA 94103 (415) 557-4657	New Construction/ Renovation	\$ 10,810,019	Apr-07	28
Angel Island State Park Immigration Station Restoration	Angel Island	State of CA, Dept. of Parks and Rec 1 Capitol Mall, Suite 500 Sacramento, CA 95814 (916) 445-7996	Renovation	\$ 10,682,000	Mar-07	68
Garfield Elementary School	Oakland	Oakland Unified School District 955 High Street Oakland, CA 94601 (510) 879-2959	Modernization	\$ 6,405,000	Nov-06	99
Foothill-De Anza Campus Center Buildings	Los Altos	Foothill-De Anza Community College District 12345 El Monte Road Los Altos Hills, CA 94002 (650) 949-6138	New Construction	\$ 20,085,000.00	Jan-07	65
Morgan Hill Courthouse and Justice Agencies Building	Morgan Hill	County of Santa Clara 2310 N. First Street, Suite 200 San Jose, CA 95131 (408) 993-4624	New Construction	\$ 31,885,000.00	Sep-07	58
Almaden Community Center and Library	San Jose	City of San Jose 200 E. Santa Clara Street, 6th Floor San Jose, CA 95113 (408) 535-8313	New Construction	\$ 17,564,000	Nov-06	99
Benicia Martinez Toll Plaza	Martinez	State of CA Dept of Transportation 4585 Pacheco Boulevard, Ste. 200 Martinez, CA 94553 (925) 957-2154	New Construction	\$ 18,993,477	Nov-06	99

Question 11.

FINANCIAL STATEMENT

West Bay Builders has included our 2005 financial statement. We are expecting our completed 2006 financials at any time, and will send them as soon as available.

Question 5.

7 YEAR CLAIMS

During the last seven years, West Bay Builders, Inc. has successfully completed over 100 public works projects. Only a few have required the initiation of legal action to resolve any disputes. All matters involving an owner, except one, have been settled by direct negotiation or through mediation without trial or arbitration. In virtually every case, West Bay Builders was paid monies as a result of its' position, thus, indicating the respective merits of the positions asserted by West Bay Builders.

In addition, there are no pending judgments against West Bay Builders by any owner.

Oakland Animal Shelter – 1101 29th Avenue, Oakland, CA

Case Number: 840197-1

Superior Court of California, County of Alameda, René C. Davidson Alameda County Courthouse, 1225 Fallon St., Oakland, CA, 94612

Plaintiff: West Bay Builders, Inc.

Defendant: City of Oakland

Date of Claim: 4/13/2001

This claim was between West Bay and the City of Oakland resulting from our subcontractor for unforeseen soil conditions. The soil was unsuitable which required complete removal, off-haul and import of clean material which was not disclosed in the soil borings. West Bay received a favorable decision following arbitration and the City of Oakland paid the judgment.

Oceana High School – 401 Paloma Avenue, Pacifica, CA

Case Number: CIV438937

Superior Court of California, County of San Mateo Southern Branch: Hall of Justice and Records, 400 County Center, (formerly 401 Marshall Street), Redwood City, California, 94063.

Plaintiff: West Bay Builders, Inc.

Defendant: Jefferson Union High School District

Date of Claim: 9/10/2004

The claim was by West Bay against the Jefferson Union High School District for change orders, additional work, and wrongfully withheld contract amounts. West Bay successfully settled this claim through mediation.

Vacaville High School – 100 Monte Vista Avenue, Vacaville, CA

Case Number: 02AS02704

Superior Court of California, County of Solano Hall of Justice, 600 Union Avenue Fairfield, CA 94533

Plaintiff: West Bay Builders, Inc.

Defendant: Vacaville Unified School District

Date of Claim: 7/15/2004

This claim was by West Bay against the Vacaville Unified School District for breach of contract for failure to pay contract balance and wrongful withholding of retention funds. This claim was resolved through mediation.

White's Hill Slide Repair – Sir Francis Drake Boulevard, Milepost 9.45-9.70, Fairfax, CA

Case Number: OAH A-0026-04

Office of Administrative Hearings, 1515 Clay St, Oakland, CA 94612

Plaintiff: West Bay Builders, Inc.

Defendant: County of Marin

Date of Claim: 3/2004

The claim was by West Bay against the County of Marin for change order work, time extensions and differing site condition. This matter was successfully settled through mediation.

Livermore VA Building 90 – 4950 Arroyo Road, Livermore, CA

Case Number: 04-1140C

Court of Federal Claims, 717 Madison Place, NW - Washington, DC 20005

Plaintiff: West Bay Builders, Inc.

Defendant: United States of America

Date of Claim: 7/9/2004

The claim was by West Bay against the Department of Veterans Affairs for an approved, but unpaid, single change order. West Bay was forced to follow procedural steps for recovery due to the retirement of the contracting officer for the project. This claim is in informal settlement negotiations.

Meadows Middle School – 4100 Camino Tassajara, Danville, CA 94526

Case Number: C04-01241

Superior Court of California, County of Contra Costa, 725 Court Street, Martinez, CA 94553

Plaintiff: West Bay Builders, Inc.

Defendant: San Ramon Valley Union School District

Date of Claim: 7/19/2004

This claim was by West Bay against the San Ramon Valley Unified School District for additional work and unpaid retention. This matter was dismissed and resolved informally.

DeLaveaga/Branciforte Junior High School – 315 Polar Avenue, Santa Cruz, CA 95062

Case Number: CV149072

Superior Court of California, County of Santa Cruz, Santa Cruz Main Courthouse, 701 Ocean Street Santa Cruz, CA

Plaintiff: West Bay Builders, Inc.

Defendant: Santa Cruz City Schools

Date of Claim: 5/21/2004

This claim is by West Bay against the Santa Cruz City Schools for additional unpaid work at the request of the District. As a result of West Bay's claim against the Owner, SCCS counter-claimed against West Bay. This matter has not been resolved.

Yountville Veterans Home – Highway 29, Yountville, CA.

Case Number: 03AS02735

Superior Court of California, County of Sacramento, Gordon D. Schaber Downtown, Courthouse 720 9th Street, Sacramento, CA 95814

Plaintiff: State of California

Defendant: West Bay Builders, Inc.

Date of Claim: 5/15/2003

This claim is by the Veteran's Home for warranty issues with the refrigeration system. West Bay's subcontractor Kamran & Co. was responsible for the alleged defects. West Bay and the Veteran's Home settled this matter informally.

Question 6.

LIQUIDATED DAMAGES

1. **SFSU Seismic Retrofit** –1600 Holloway Avenue, San Francisco, CA. This project was completed in August of 2002. Currently we have a claim filed against West 1 Construction, our asbestos subcontractor on the San Francisco State University Project for the liquidated damages assessed by the Owner for \$136,500. The nature of this claim is surrounding West 1 because they removed and disposed of some of the existing HVAC mixing boxes that were not supposed to be removed. Once discovered, this issue forced us to re-design and re-build these units, thus adding a substantial amount of cost and delay to the project.

Owner: San Francisco State University

Address: 1600 Holloway Avenue, San Francisco.94132

Phone: Mark Van Pelt

Contact: 707-438-3790

2. **Port of Oakland Admin Building** – 1749 Middle Harbor Road, Oakland, CA. This project was completed in May of 2001, however, this project was linked with the Marine Operations Building, which lasted another year. Currently we have resolved one claim against Glass & Sash, who accepted their portion of the LDs and the remaining claim is against North Winds, our steel subcontractor on this project for the liquidated damages assessed by the Owner for \$140,000 in November 2002. The nature of the claims surrounding these subcontractors is 1) Glass & Sash provided insufficient manpower 2) North Winds had hired a steel detailer from out of the country who could not get the detailing done within project schedule. North Winds themselves could not fabricate and erect the structural steel according to the agreed upon project schedule. When the steel was late due to the detailing, North Winds did not work at an adequate number of hours to recover the delay resulting from their detailer.

Owner: Port of Oakland

Address: 530 Water Street, Oakland, CA 94607

Phone: 925-765-3663

Contact: Paul Kooner

3. **Phoebe Apperson Hearst Elementary School** – 5301 Case Avenue, Pleasanton, CA. This project was completed October 15, 2001. Three subcontractors were unable to supply sufficient manpower for the project and caused significant delays. As a result, West Bay was assessed \$100,000 in liquidated damages in January of 2002. West Bay back-charged all three subcontractors on this project. Two of which clearly acknowledged causing delays and the assessment of the third subcontractor, S & S Cummins is currently being litigated.

Owner: Pleasanton Unified School District

Address: 4750 First Street, Pleasanton, CA 94566

Phone: 925-426-4404

Contact: George Hefner

4. **Alum Rock Branch Library** – 3090 Alum Rock Avenue, San Jose, CA. This project was completed January 2006. The glass subcontractor on the job was unable to complete their subcontract scope of work timely due to glass manufacturing issues. In December 2005, West Bay was assessed \$90,000 in liquidated damages due to this error which is directly attributable to our glass subcontractor and for which we have back-charged them accordingly.

Owner: City of San Jose

Address: 200 E. Santa Clara Street, 6th Floor, San Jose, CA 95113

Phone: 408-535-8313

Contact: Benjamin Gonzalez

5. **Ingrid B. Lacy Middle School** – 1427 Palmetto Drive, Pacifica, CA. This project was completed March 2003. The plumbing subcontractor walked off the job and left the country, leaving WBB to complete the unfinished plumbing work. The electrical subcontractor was unable to supply sufficient

manpower for the project, which also caused delays. In August of 2003, West Bay was assessed \$63,000 in liquidated damages due to the electrical system installation delays and plumbing installation delays. Both Subcontracts were back-charged with no dispute from the subcontractors and no other issues are pending.

Owner: Pacifica School District

Address: 375 Reina Del Mar, Pacifica, CA 94044

Phone: 650-738-6601

Contact: Jim Lianides

Question 12.

BIDDERS ORGANIZATION

West Bay Builders, Inc., no matter what type of bid delivery method, is always looking to expand our company and to gain new opportunities and build new relationships in our industry. The teams in which WBB puts together on a project are formed with the intent to present each member of the team as a person who will be well-versed in the familiarity of the specific project. As a tool to ensure a valuable team, WBB communicates our objectives clearly to all members of the team, both internally and externally.

We have proved that these practices solidify the commitment to each other that all parties will do what it takes to make this a win-win scenario for all involved. We look forward to implementing these methods for a successful project and intend to always leave room to improve upon them.

Below is an organization structure for our proposed team for this project and offer the following as our standard functions for each member of the team:

President/Project Executive/Owner - Paul Thompson – Paul started West Bay Builders, Inc. in 1989. He is responsible for supervision of all personnel and projects. His background is in management of multi-million dollar public work projects. He has in-depth knowledge of plans and specifications, and is experienced in scheduling and personnel management.

Project Manager – Chris Van Tiem - Oversees and directs construction management. Communicates directly with contractors/designers concerning project cost, staffing, and scheduling. Prepares project status reports and works to ensure plans adhere to contract specifications. Familiar with a variety of the field's concepts, practices, and procedures. Performs a variety of tasks.

Superintendent - Oversees the daily construction activities at work site, including scheduling of workers, delivery of equipment and materials, and progress of the project and its safety. Works to complete project within the given budget and timeframe. Resolves contract disputes and arranges any necessary order changes. Extensive experience with a variety of the field's concepts, practices, and procedures. Leads and directs the work of others.

Project Engineer – Assists the Project manager with daily construction management including cost, scheduling, and the implementation of all policies. Works with the Administrator and other assigned project staff to provide direction, prioritization, performance feedback and coordination to ensure all job duties and project requirements are fulfilled.

Project Administrator - Supervises and participates in the preparation and negotiation of contracts, and administration of contracts in accordance with company policies and legal requirements. Familiar with a variety of the field's concepts, practices, and procedures. Performs any/all administrative tasks necessary for the project.

Subcontractors – At this point in time, WBB is unsure who will be part of their team for this project, as we have not received all competitive bids. However, the major subcontractors on this job will include electrical, mechanical, steel, rebar, site work, and masonry work.

Question 13.

BIDDERS EXPERIENCE

13a. BENICIA-MARTINEZ TOLL PLAZA (\$21,176,920)
State of California Department of Transportation
4585 Pacheco Boulevard, Suite 200
Martinez, CA 94533
Contact: Agnes Liu
(925) 957-2154
agnes_liu@dot.ca.gov

CESAR CHAVEZ EDUCATION CENTER (\$21,195,194)
Oakland Unified School District
955 High Street
Oakland, CA 94601
Contact: Stephen Fernandes
(510) 879-8698
sfernandes@mccarthy.com

EVERGREEN ELEMENTARY SCHOOL (\$16,007,517)
Evergreen School District
3188 Quimby Road
San Jose, CA 95148
Contact: Jim Crawford
(408) 270-6800
jcrawford@eesd.org

ALMADEN COMMUNITY CENTER & BRANCH LIBRARY (\$18,880,343)
City of San Jose
200 East Santa Clara Street, 6th Floor
San Jose, CA 95113
Contact: Rodney Rapson
(408) 535-8410
rodney.rapson@sanjoseca.gov

MANTECA BIG LEAGUE DREAMS SPORTS PARK (\$25,566,901)
City of Manteca
252 Magnolia Lane
Manteca, CA 95337
Contact: Steve Houx
(209) 239-8470
shoux@ci.manteca.us

13b. BENICIA-MARTINEZ TOLL PLAZA (\$21,176,920)

State of California Department of Transportation

4585 Pacheco Boulevard, Suite 200

Martinez, CA 94533

Contact: Agnes Liu

(925) 957-2154

agnes_liu@dot.ca.gov

YBI VIADUCT RETROFIT & MAINTENANCE SUBSTATION (\$11,214,241)

State of California Department of Transportation

250 Beale Street

San Francisco, CA 94105

Contact: Beau Wrightson

(415) 356-6630

beau.wrightson@dot.ca.gov

ALMADEN COMMUNITY CENTER & BRANCH LIBRARY (\$18,880,343)

City of San Jose

200 East Santa Clara Street, 6th Floor

San Jose, CA 95113

Contact: Rodney Rapson

(408) 535-8410

rodney.rapson@sanjoseca.gov

13c. Please see attached Resume...

2001 - 2003	West Valley Branch Library	\$ 6,083,000
2001 - 2002	Fremont H.S. Swim Complex	\$ 2,403,985
2001 - 2001	Fremont H.S. Phase 1B	\$ 1,658,000
2000 - 2002	Tuers Golf Course	\$ 4,613,000
1999 - 2000	Lincoln Child Center	\$ 1,320,000
1999 - 2000	Skyhawk Elementary School	\$ 6,105,000

CLIENT REFERENCES UPON REQUEST

BID FORM - DOCUMENT 2

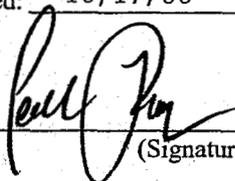
THE FOLLOWING CERTIFICATION MUST BE SIGNED BY AN OWNER, GENERAL PARTNER, OR OFFICER OF BIDDER.

I DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA, AND DO PERSONALLY CERTIFY AND ATTEST THAT: I HAVE THOROUGHLY REVIEWED THE ATTACHED BIDDER QUALIFICATION QUESTIONNAIRE, AND KNOW ITS CONTENTS, AND CERTIFY THAT THE RESPONSES PROVIDED TO THE BIDDER QUALIFICATION QUESTIONNAIRE ARE TRUTHFUL, COMPLETE AND ACCURATE; AND THAT SANTA CRUZ METROPOLITAN TRANSIT DISTRICT MAY REASONABLY RELY UPON THE CONTENTS AS BEING COMPLETE AND ACCURATE; AND, FURTHER, THAT I AM FAMILIAR WITH CALIFORNIA PENAL CODE SECTION 72 AND CALIFORNIA GOVERNMENT CODE SECTION 12650, ET SEQ, PERTAINING TO FALSE CLAIMS, AND FURTHER KNOW AND UNDERSTAND THAT SUBMISSION OR CERTIFICATION OF A FALSE CLAIM MAY LEAD TO FINES, IMPRISONMENT AND/OR OTHER SEVERE LEGAL CONSEQUENCES. I FURTHER CERTIFY THAT BIDDER MEETS THE MINIMUM QUALIFICATION CRITERIA SET FORTH HEREIN.

Executed on the date indicated below, at the location indicated below.

Dated: 10/17/06

Bidder: West Bay Builders, Inc.
(Company's Name)

By: 
(Signature)

Paul Thompson, President
(Printed name of signor)

President
(Title of signor)

BID FORM – DOCUMENT 3
NON-COLLUSION AFFIDAVIT

(TO BE SIGNED BY BIDDER AND SUBMITTED WITH BID)

Pursuant to Section 7106 of the Public Contract Code,

Paul Thompson
(Name)

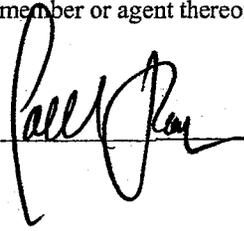
being first duly sworn, deposes and says that he or she is

President
(Title)

of West Bay Builders, Inc.
(Company Name)

the party making the foregoing bid; the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Signature



***See attached Acknowledgement

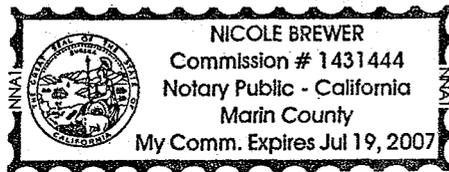
CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California }
County of Marin } ss.

On October 17, 2006 before me, Nicole Brewer, Notary Public
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Paul Thomopson
Name(s) of Signer(s)

personally known to me
 proved to me on the basis of satisfactory evidence



to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Nicole Brewer
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Non-Collusion Affidavit - Metrobase Bid No. 06-01

Document Date: _____ Number of Pages: _____

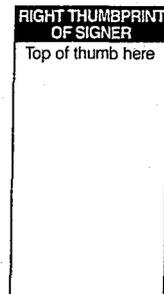
Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner — Limited General
- Attorney-in-Fact
- Trustee
- Guardian or Conservator
- Other: _____

Signer Is Representing: _____



**BID FORM - DOCUMENT 4
BIDDER'S BOND**

That we West Bay Builders, Inc.

As PRINCIPAL and

Safeco Insurance Company of America As SURETY, are held and firmly bound unto the Santa Cruz Metropolitan Transit District herein called "METRO" OR "DISTRICT" the sum of TEN (10) PERCENT OF THE TOTAL AMOUNT OF THE BID of the Principal named above, submitted by said Principal to the METRO for the work described below, for the payment of which lawful money of the United States of America, well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents. In no case shall the liability of the Surety hereunder exceed the sum of \$ Ten Percent of Total Amount Bid (10%)

THE CONDITION OF THIS OBLIGATION IS SUCH,

That whereas the Principal has submitted a Bid No. 06-01 for certain construction specifically described as follows, which is to be opened on OCTOBER 17, 2006 for Labor and materials to construct the MetroBase Project Phase 1 located in Santa Cruz, CA.

NOW, THEREFORE, if the aforesaid Principal is awarded a Contract, and within the time and manner required under the specifications, after the prescribed forms are presented to it for signature, enters into a written Contract, in the prescribed form in accordance with the Bid, and files two bonds with the METRO, one to guarantee faithful performance and the other to guarantee payment for labor and materials, then this obligation shall be null and void, otherwise, it shall be and remain in full force and effect.

In the event that the METRO brings suit upon this bond and judgment is recovered, the Surety shall pay all costs incurred by the METRO in such suit, including a reasonable attorney's fee to be fixed by the court.

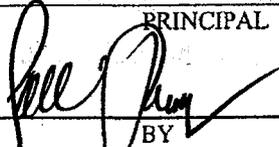
California law shall govern the interpretation of this bond.

To be considered complete, both the Bidder and an admitted Surety insurer authorized by the California Insurance Commissioner to transact surety business in the State of California must sign this Bidder's bond. In addition, the Surety's signature must be notarized and a copy of the Surety's power of attorney must be attached.

In witness whereof, WE HAVE HEREUNTO SET OUR HANDS AND SEALS ON THIS 12th DAY OF October, 2006.

West Bay Builders, Inc.

PRINCIPAL

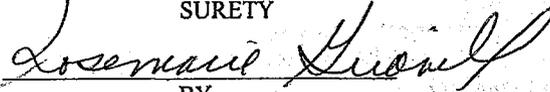


BY

Paul Thompson, President

PRINCIPAL SEAL

Safeco Insurance Company of America
SURETY



BY

Rosemarie Guanill, Attorney-in-Fact

SURETY SEAL

400 Taylor Blvd.
Pleasant Hill, Ca. 94523
ADDRESS OF SURETY

[End of Bidders Bond.]

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

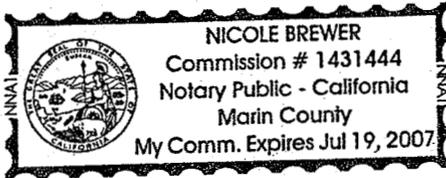
State of California }
County of Marin } ss.

On October 12, 2006 before me, Nicole Brewer, Notary Public
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Paul Thomopson
Name(s) of Signer(s)

personally known to me
 proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

[Signature]
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Bidder's Bond - Metrobase Bid No. 06-01

Document Date: _____ Number of Pages: _____

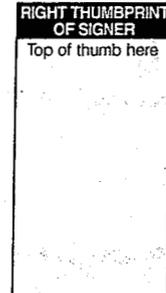
Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner — Limited General
- Attorney-in-Fact
- Trustee
- Guardian or Conservator
- Other: _____

Signer Is Representing: _____



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

No. 5907

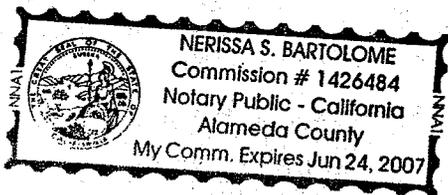
State of California

County of San Francisco

On October 12, 2006 before me, Nerissa S. Bartolome, Notary Public
DATE NAME, TITLE OF OFFICER - E.G., "JANE DOE, NOTARY PUBLIC"

personally appeared Rosemarie Guanill
NAME(S) OF SIGNER(S)

personally known to me - OR - proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Nerissa S. Bartolome
SIGNATURE OF NOTARY

OPTIONAL

Though the data below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent reattachment of this form.

CAPACITY CLAIMED BY SIGNER

- INDIVIDUAL
- CORPORATE OFFICER

TITLE(S)

- PARTNER(S) LIMITED
- GENERAL

ATTORNEY-IN-FACT

- TRUSTEE(S)
- GUARDIAN/CONSERVATOR

OTHER: _____

DESCRIPTION OF ATTACHED DOCUMENT

Bid Bond

TITLE OR TYPE OF DOCUMENT

NUMBER OF PAGES

DATE OF DOCUMENT

SIGNER IS REPRESENTING:

NAME OF PERSON(S) OR ENTITY(IES)

Safeco Insurance Company
of America

SIGNER(S) OTHER THAN NAMED ABOVE



POWER OF ATTORNEY

Safeco Insurance Companies
PO Box 34526
Seattle, WA 98124-1526

No. 9437

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

*****NERISSA S. BARTOLOME; ROGER C. DICKINSON; ROSEMARIE GUANILL; NANCY L. HAMILTON; STANLEY D. LOAR; MARK M. MUNEKAWA; JEFFREY W. PARKHURST; CHARLES R. SHOEMAKER; San Francisco, California*****

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 28th day of September, 2005

Stephanie Daley-Watson

Mike Peters

STEPHANIE DALEY-WATSON, SECRETARY

MIKE PETERS, PRESIDENT, SURETY

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business... On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
- (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
- (iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, Stephanie Daley-Watson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 12th day of October, 2006



Stephanie Daley-Watson

STEPHANIE DALEY-WATSON, SECRETARY

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BID FORM – DOCUMENT 5

**CERTIFICATION OF PROPOSED CONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Prime Contracts totaling over \$100,000)

(Contractor) West Bay Builders, Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

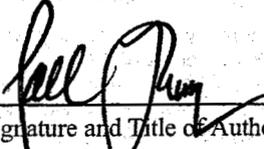
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Contractor) West Bay Builders, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.



Signature and Title of Authorized Official
Paul Thompson, President

BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) A & B Painting, Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

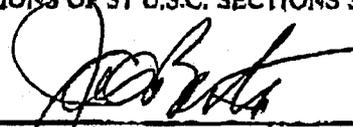
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) A & B Painting, Inc. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.



Signature and Title of Authorized Official
James C. Berta
Controller/Secretary
A & B Painting, Inc.

A + B PAINTING, INC

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

- NONE -

Multiple horizontal lines for listing information.

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

A + B PAINTING, INC.
Company Name



BID FORM - DOCUMENT 6

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling over \$100,000)

(Subcontractor) Bratton Masonry, Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

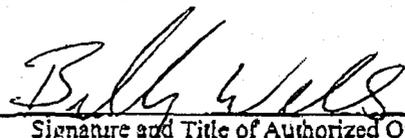
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) Bratton Masonry, Inc CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.



Signature and Title of Authorized Official

LOCATION:4154590665

RX TIME 10/18 '06 16:30

Part II-11

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

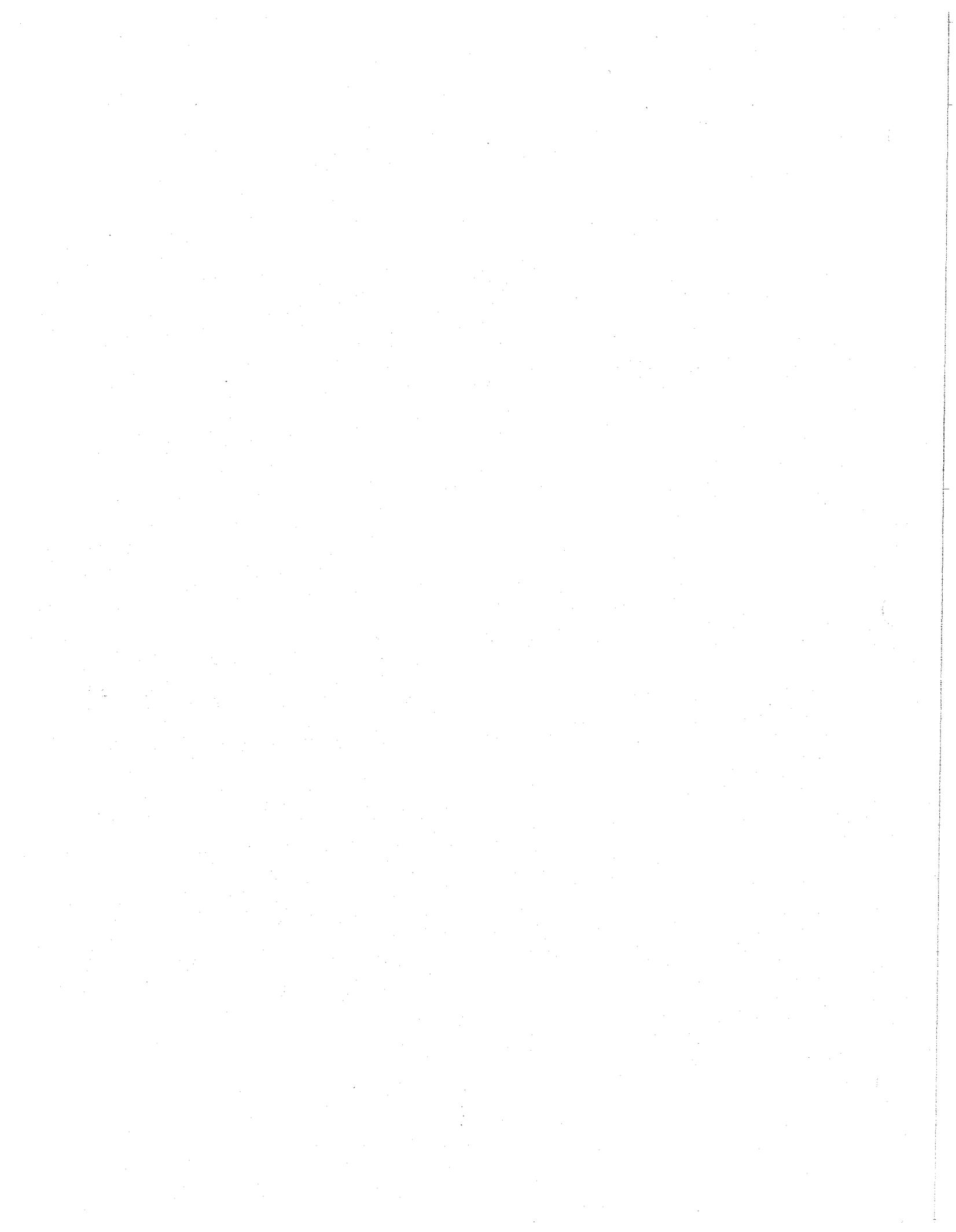
Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program, (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dol.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

**BRATTON MASONRY, INC
2763 N ARGYLE
FRESNO, CA 93727**

Company Name



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) Concord Iron Works, Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

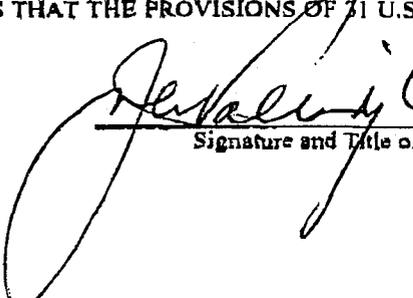
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) Concord Iron Works, Inc. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

 Estimator
Signature and Title of Authorized Official

Part II-11

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any Federal, state, or local governmental agency, or district.

Not Applicable

Part II-13

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

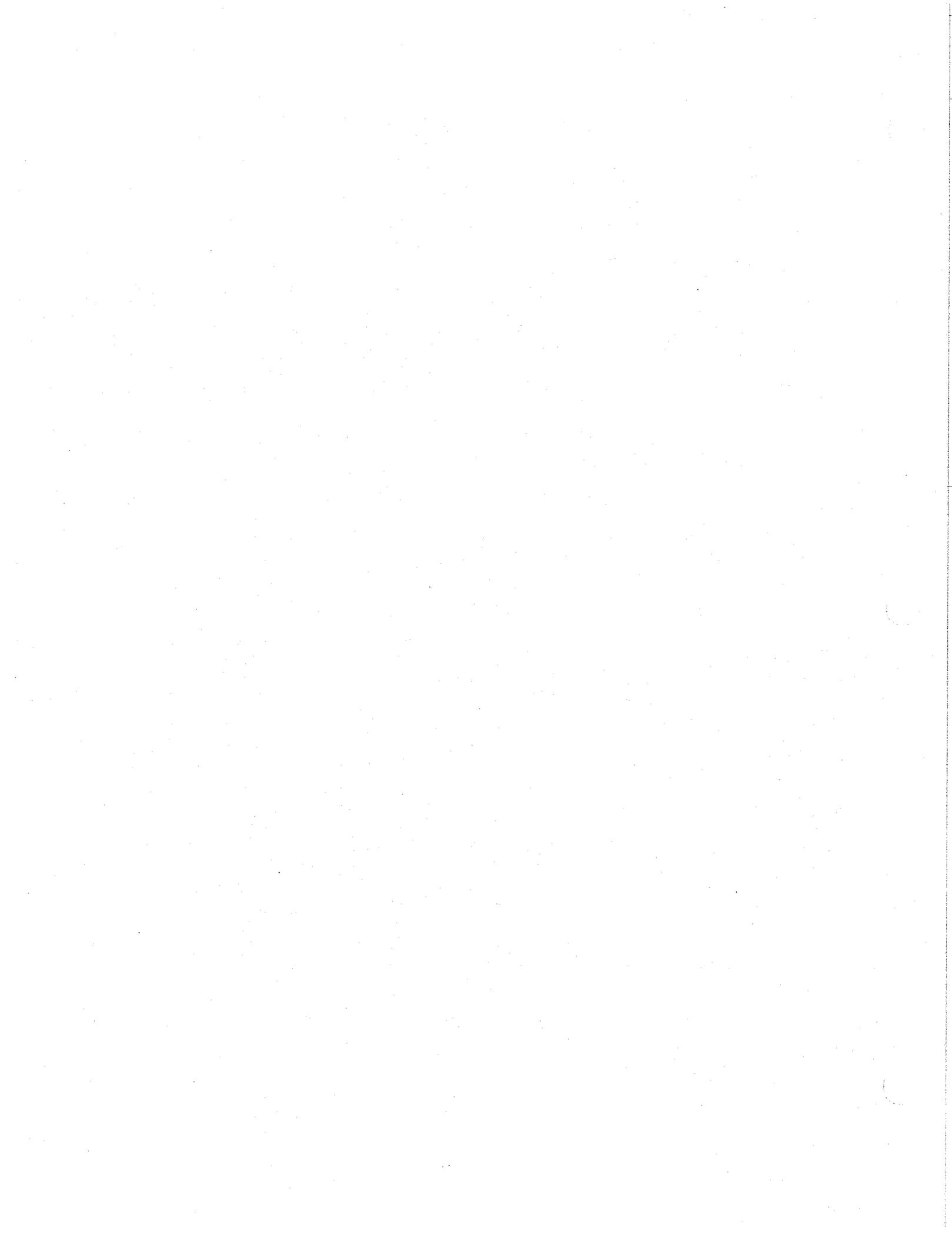
- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier **is not** a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: [http://www.dot.ca.gov/hq/bep/Roster of Certifying Agencies 09-16-03.doc](http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc) for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Concord Iron Works, Inc.
Company Name



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) ESCOBAR & ESCOBAR certifies to the best of its knowledge and belief, that it and its principals: CONCRETE CONSTRUCTION

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

ESCOBAR & ESCOBAR (Subcontractor) CONCRETE CONST. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Catherine Escobar

Signature and Title of Authorized Official

General Partner

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

None

Escobar & Escobar
Concrete Construction
PO Box 3606
Salinas, CA 93912-3606

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individual; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program. WBE 5/1/2007
- Certification No. CT-014573 Expiration Date DBE 3/1/2006*
DBE / WBE * RENEWAL APPLICATION SUBMITTED
- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

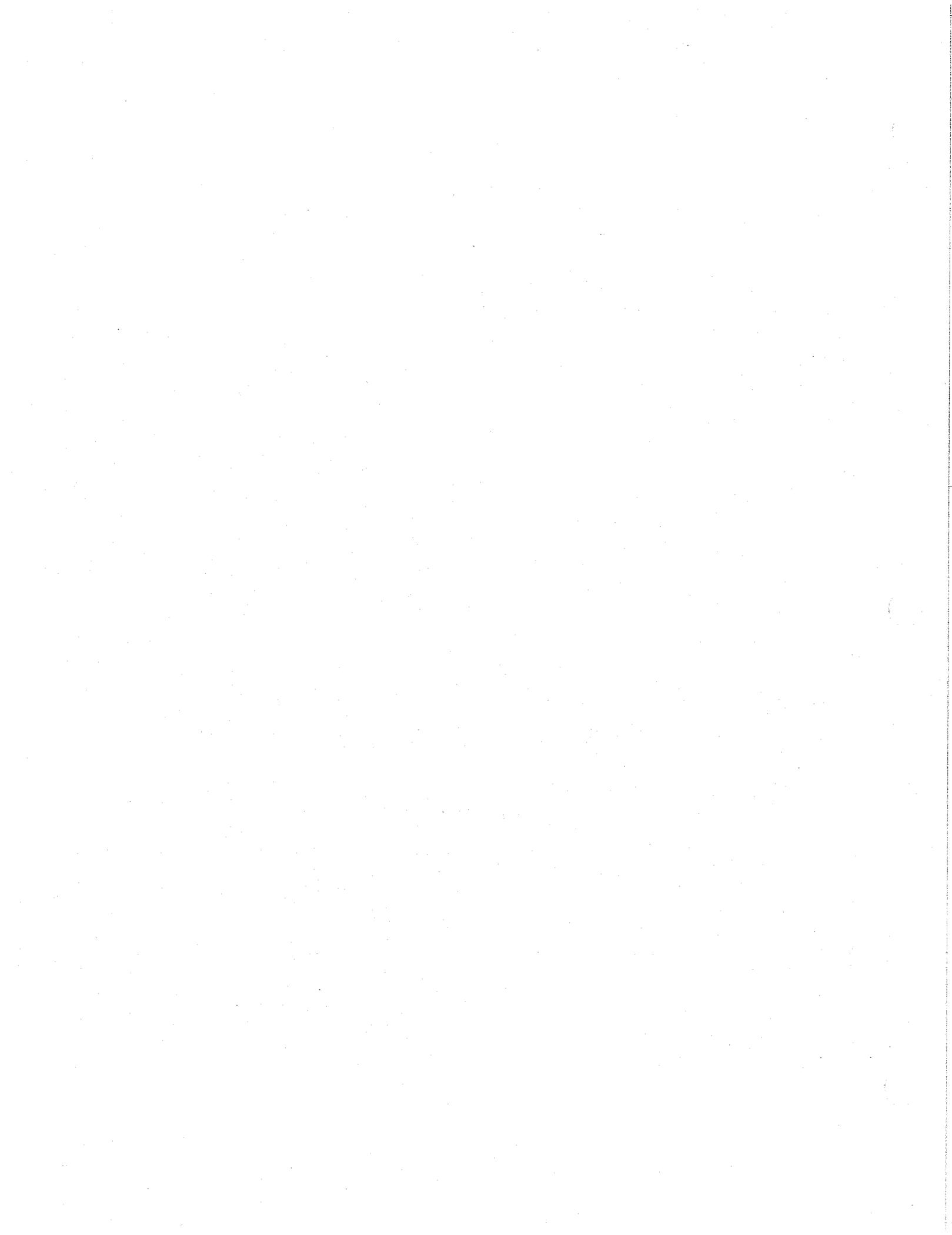
Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program, (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Carmen Escobar
Company Name
General Partner

Escobar & Escobar
Concrete Construction
PO Box 3606
Salinas, CA 93912-3606



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION

(For Subcontracts totaling over \$100,000)

F. RODGERS SPECIALTY CONTRACTOR, INC.
(Subcontractor) certifies to the best of its knowledge and belief, that it and
its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

F. RODGERS SPECIALTY CONTRACTOR, INC.
(Subcontractor) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND
ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS
CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ.
ARE APPLICABLE THERETO.


Signature and Title of Authorized Official



F. RODGERS
SPECIALTY CONTRACTOR, INC.

Thermal Insulation & Specialty Contractor

CONTRACTOR'S LIC.# 490746

13751 W. BOWLING ROAD, FERRIS, CA 94501 - WWW.FRODGERS.COM

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

None

Handwritten 'None' circled in black, covering the first few lines of a list of horizontal lines.



F. RODGERS

SPECIALTY CONTRACTOR, INC.

Thermal Insulation & Specialty Contractor

CONTRACTOR'S LIC. # 499756

Part II-13

17700 S. POSTS ROAD, LIVERMORE, CA 94551 WWW.FRODGERS.COM

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program, (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Rodgers

Company Name

We are not
DBE, WBE
or "BE"

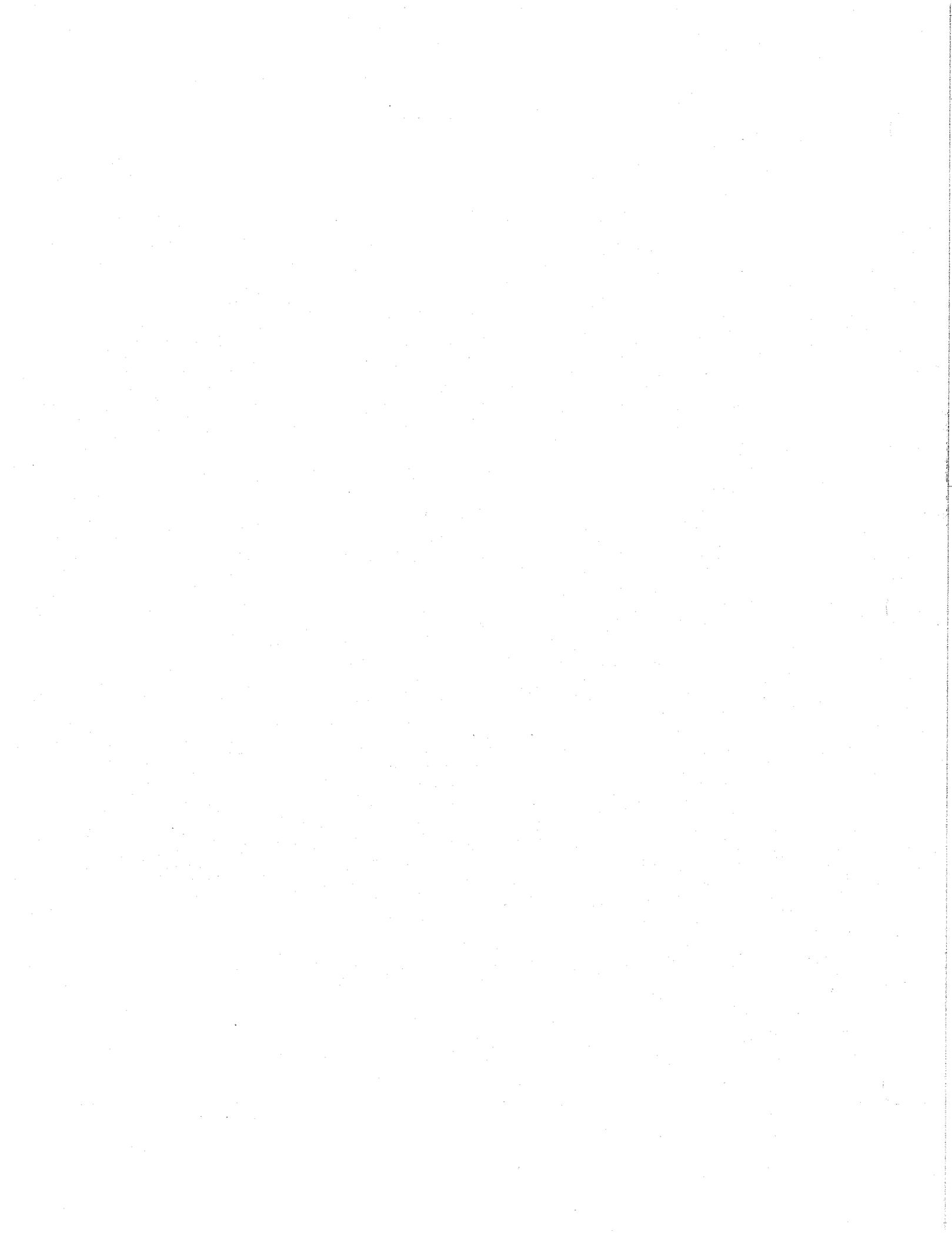


F. RODGERS
SPECIALTY CONTRACTOR, INC.

Thermal Insulation & Specialty Contractor

CONTRACTOR'S LIC. # 489756





BLD FORM - DOCUMENT 6

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling over \$100,000)

(Subcontractor) JAKE SHUMAKER certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) JAKE SHUMAKER, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Jake I. Shumaker
Signature and Title of Authorized Official
PRESIDENT

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

NONE

Multiple horizontal lines for listing information, all of which are currently blank.

Part II-13

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

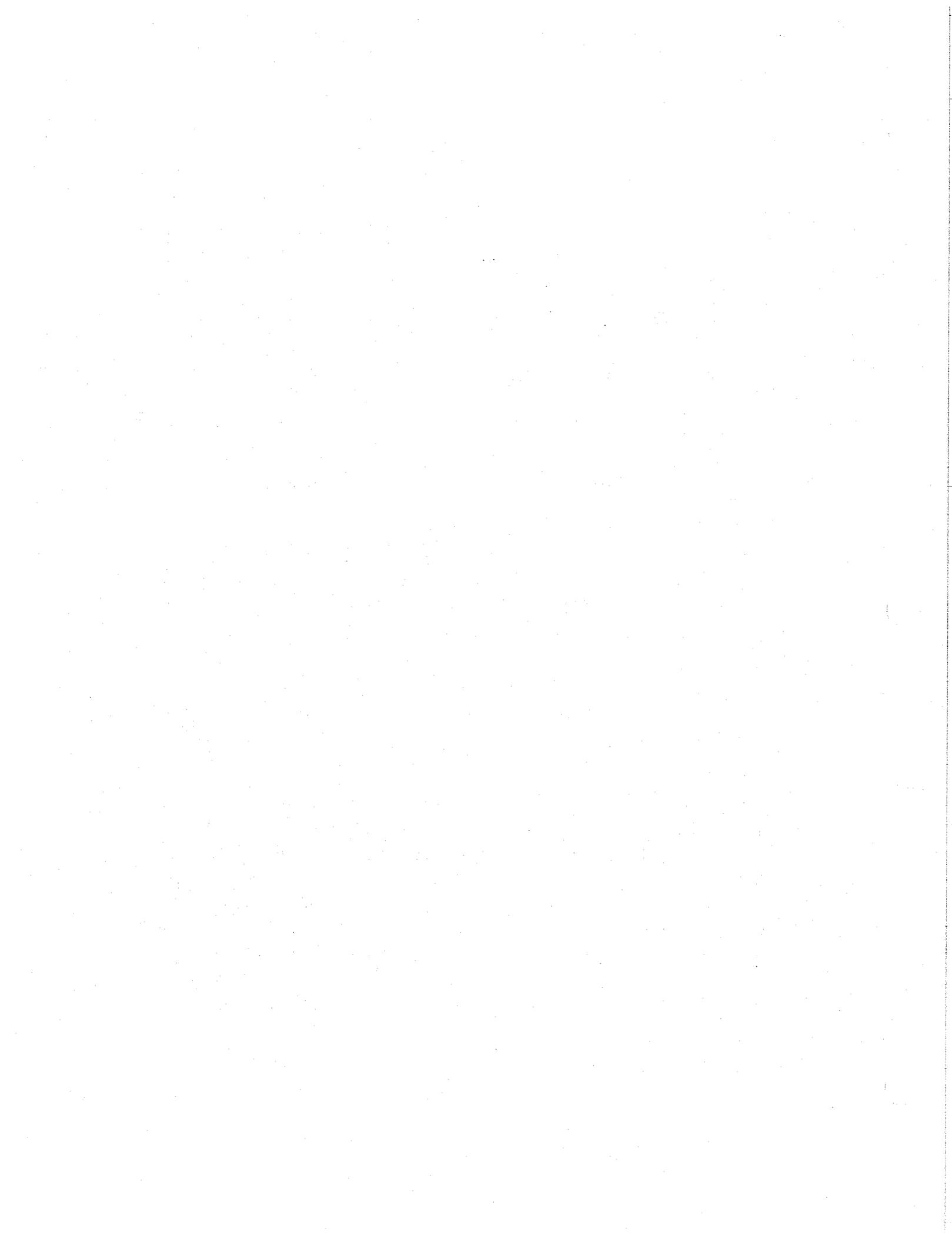
The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

JAKE SHUMAKER
Company Name



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) JM Electric certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

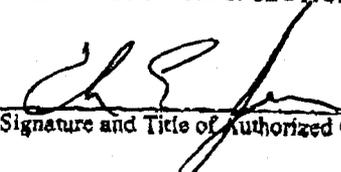
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) JM Electric, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.


Signature and Title of Authorized Official

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

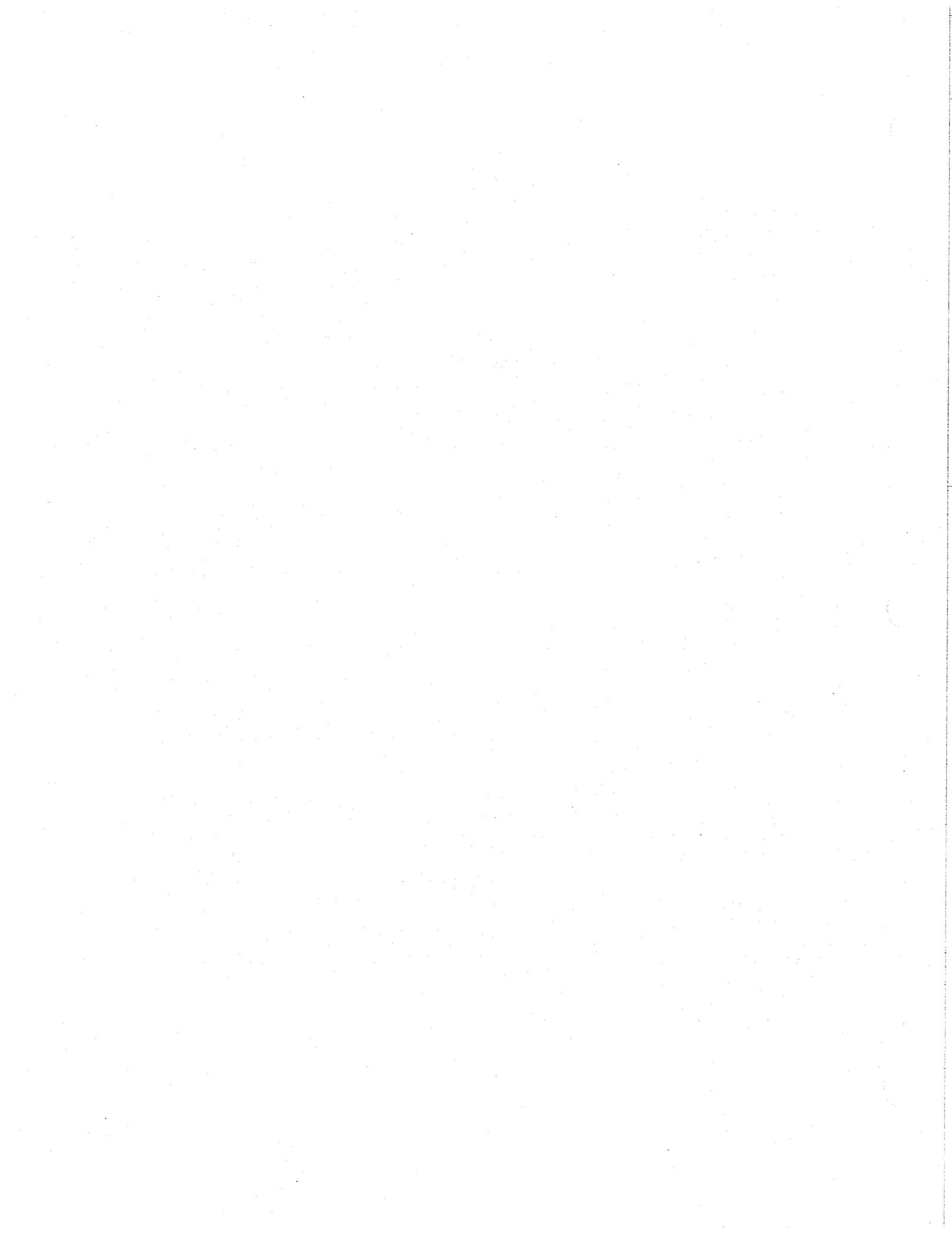
Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

JMM Electric

Company Name





BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) Louis R. Pappalardo, Inc certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

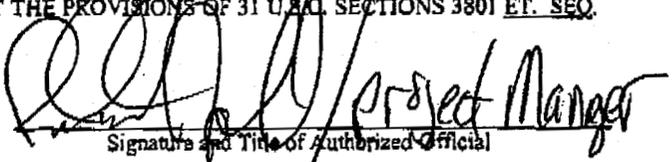
Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) Louis R. Pappalardo, Inc, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.


Signature and Title of Authorized Official

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Louis R. Marretti, Inc.
Company Name



10/18/2006 15:39 9256910742

MARQUEE FIRE

PAGE 03

10/18/2006 15:19 FAX 4164680685

WEST BAY BUILDERS

002/002

BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) MARQUEE FIRE PROTECTION certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) MARQUEE FIRE PROTECTION CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Handwritten signature of Kimberly Reed

Signature and Title of Authorized Official
Kimberly Reed, Vice President

Part II-11

10/18/2006 16:44 9256910742

MARQUEE FIRE

PAGE 05

10/18/2006 18:51 FAX 4134880885

WEST BAY BUILDERS

004/005

**BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS**

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

None.

Multiple horizontal lines for listing positions.

Part 11-13

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

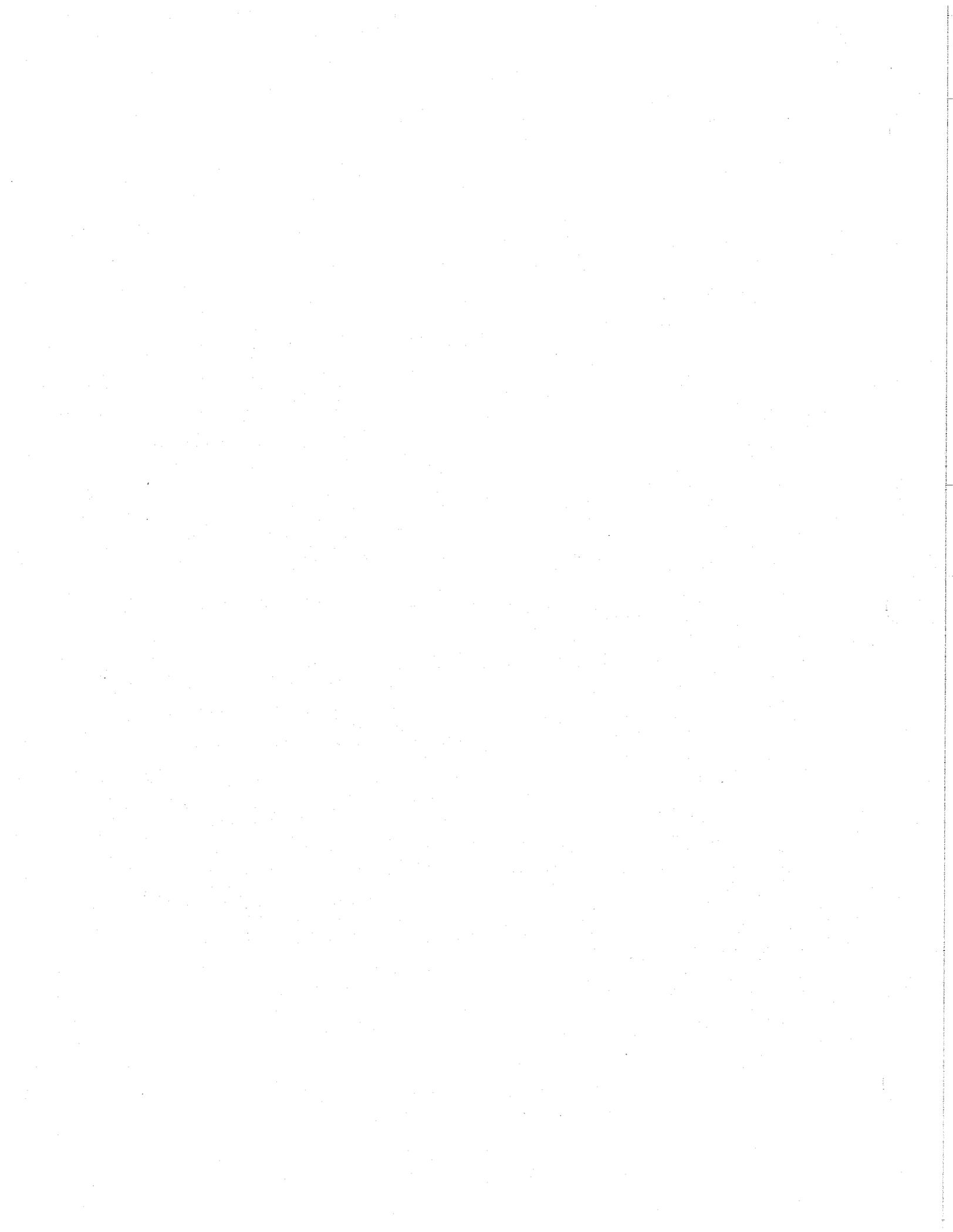
Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

L. Marquee Fire Protection

Company Name
J. Anthony



BID FORM - DOCUMENT 7

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling \$100,000 or less)

(Subcontractor) WEST BAY BUILDERS INC certifies, by submission of this bid, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) WEST BAY BUILDERS INC CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

[Signature]
Signature and Title of Authorized Official

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

NONE

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

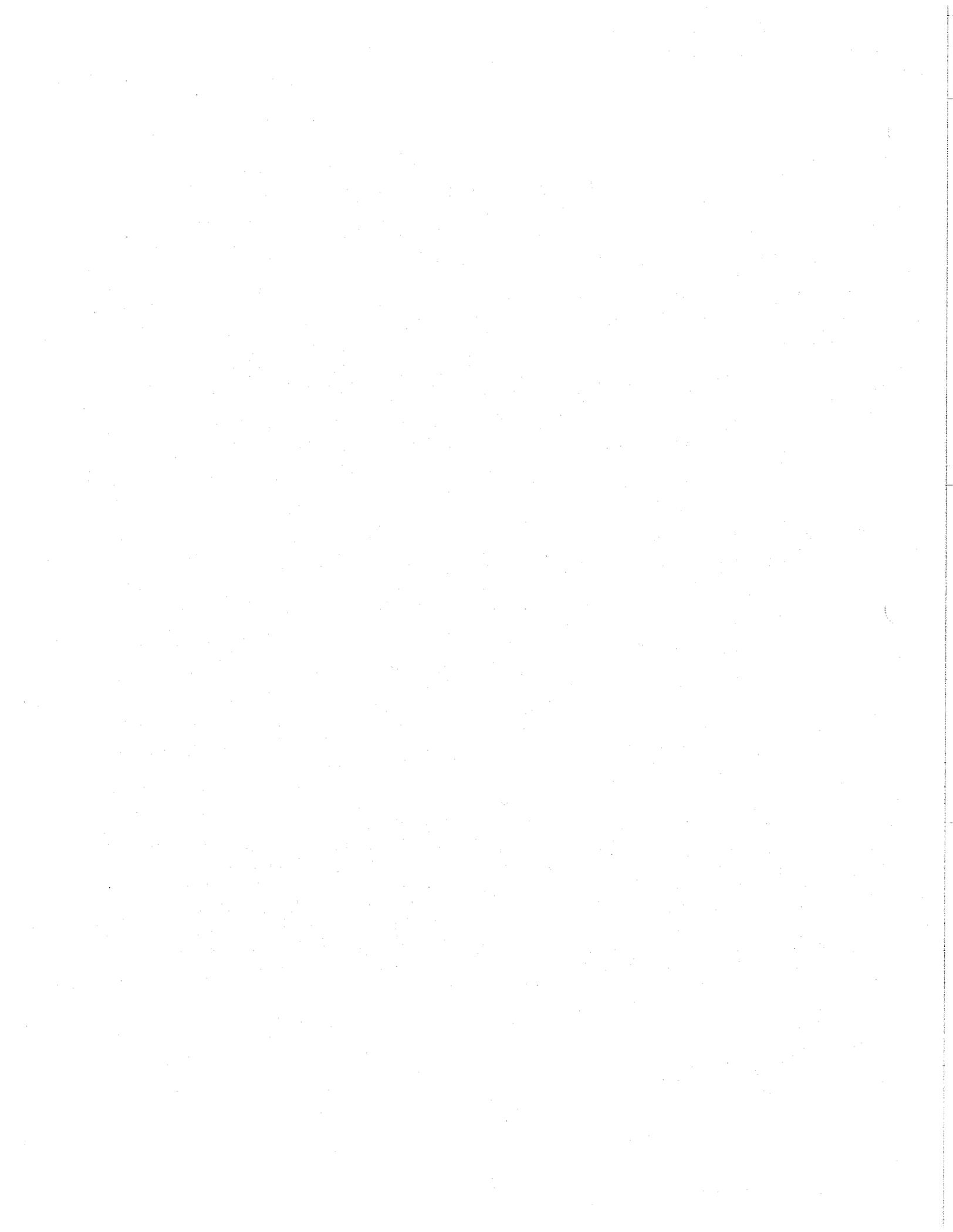
The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

WEST BAY CONCRETE WORKS, INC
Company Name



BID FORM - DOCUMENT 6

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling over \$100,000)

(Subcontractor) O.C. McDonald Co., Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) O.C. McDonald Co., Inc. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.



Signature and Title of Authorized Official

Ray Sheik, Vice President

**BID FORM -- DOCUMENT 12
DBE CERTIFICATE PART 2 -- SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier **is not** a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

O.C. McDonald Co., Inc.

Company Name



BID FORM -- DOCUMENT 6

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY
EXCLUSION**

(For Subcontracts totaling over \$100,000)

(Subcontractor) Pace, Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) Pace, Inc. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Signature and Title of Authorized Official

Part II-11

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a **DBE**. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

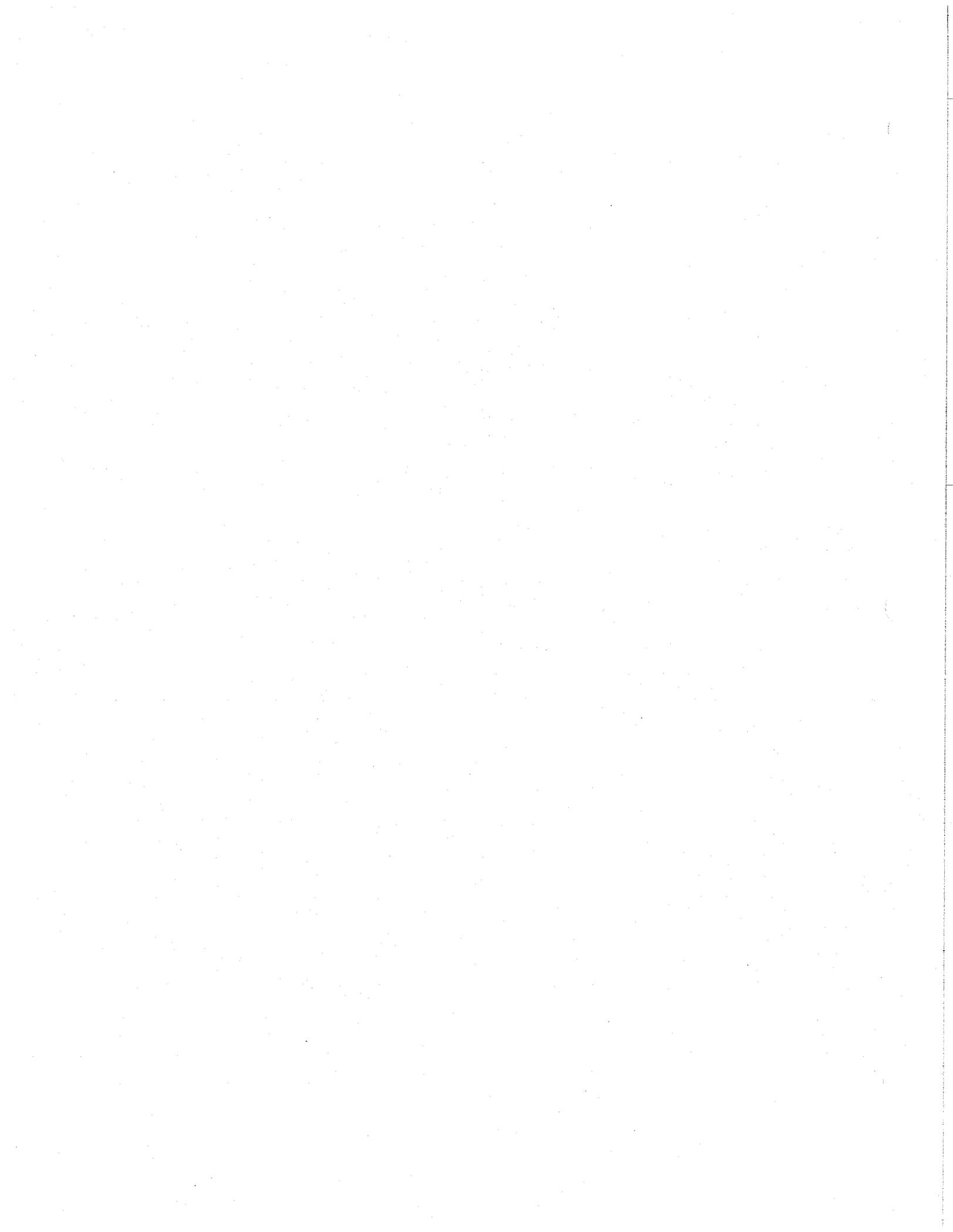
- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: [http://www.dot.ca.gov/hq/bep/Roster of Certifying Agencies 09-16-03.doc](http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc) for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Pace, Inc.
Company Name



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) PETERSON HYD, INC. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) PETERSON HYD, INC. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Daniel H. Peterson
Signature and Title of Authorized Official

**BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS**

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

NONE

PETERSON HYDRAULICS, INC
13509 RAMMOND AVE.
GARDENA, CA 90247-2007

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

PETERSON HYDRAULICS

Company Name

PETERSON HYDRAULICS, INC
13509 RAYMOND AVE
GARDENA, CA 90247-2007

BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bap/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

PETERSON HYDRAULICS
Company Name

PETERSON HYDRAULICS, INC
13509 RAYMOND AVE
GARDENA, CA 90247-2007

BID FORM - DOCUMENT 7

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

QUALITY LANDSCAPE SERVICE, INC. (For Subcontracts totaling \$100,000 or less)

(Subcontractor) certifies, by submission of this bid, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

QUALITY LANDSCAPE SERVICE, INC. (Subcontractor) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

Handwritten signature of Donald R. Love

Signature and Title of Authorized Official

PRESIDENT

10/18/2008 17:51 FAX 4154590665

WEST BAY BUILDERS

004/005

**BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS**

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

NONE

Multiple horizontal lines for listing positions.

Part II-13

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

- The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

- The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

- The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_02-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

QUALITY LANDSCAPE SERVICE, INC.

Company Name



BID FORM - DOCUMENT 6

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

(For Subcontracts totaling over \$100,000)

(Subcontractor) Titan Construction/Steel Inc. certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a three year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

Have not within a three year period preceding this bid had one or more public transactions (Federal, State or local) terminated for cause or default.

If the Proposed Subcontractor is unable to certify to any of the statements in this certification, it shall attach an explanation to this certification.

(Subcontractor) Titan Construction/Steel Inc. CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

 President
Signature and Title of Authorized Official

BID FORM - DOCUMENT 8
DISCLOSURE OF GOVERNMENTAL POSITIONS

List all Bidders and Subcontractor's employees who within the last twelve months have held or do hold any positions as directors, officers, Contractors or employees of any federal, state, or local governmental agency, or district.

WA

**BID FORM - DOCUMENT 12
DBE CERTIFICATE PART 2 - SUBCONTRACTORS**

Only small business concerns as defined by the United States Small Business Administration which are owned and controlled by one or more socially and economically disadvantaged individuals, can be certified as a DBE. Owned and controlled means:

- At least 51 percent of the small business concern is owned by one or more socially and economically disadvantaged individuals; and
- Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

Please check one of the following boxes and provide corresponding information if necessary:

The Subcontractor/Supplier is a CalTrans certified DBE under the CalTrans Uniform Certification Program.

Certification No. _____ Expiration Date _____

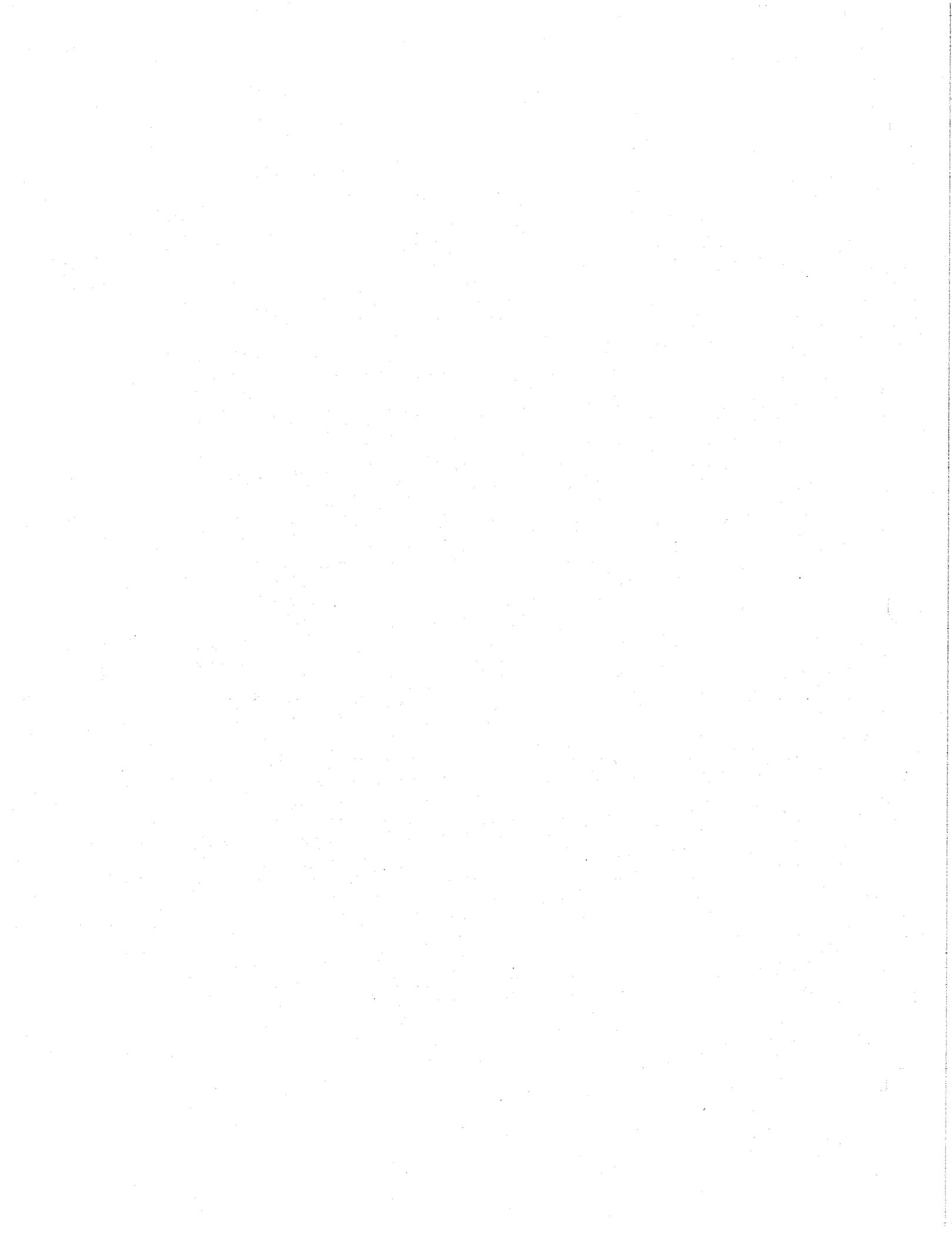
The subcontractor/Supplier has applied for DBE status through the CalTrans Uniform Certification Program.

Application Date _____ Status of Application _____

The Subcontractor/Supplier is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

The purpose of the California Department of Transportation (Caltrans), Civil Rights Program is to increase the level of participation of disadvantaged businesses in all Federal contracting activities. Pursuant to Federal regulations, to participate in our program, qualifying firms must first be certified as a Disadvantaged Business Enterprise (DBE) by the Caltrans Civil Rights Program. (916) 324-1700 or toll free at (866) 810-6346. You can also access the following website: http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Titan Construction & Steel Inc.
Company Name



BID FORM - DOCUMENT 9 DESIGNATION OF SUBCONTRACTORS

To comply with the requirements of the California Subletting and Subcontracting Fair Practices Act, bidder shall list the name and address of each Subcontractor, including D.B.E. Subcontractor to whom bidder proposes to Subcontract more than 1/2 of 1 percent of the work, and description and portions of the Work or services Subcontracted.

Attach additional copies of this form if more space is required.

Name of Subcontractor	Business Address	Trade/Craft	% of Total Bid
XXXXXXXXXX (PT) ST MANJINI	XXXXXXXXXX (PT) MILITAS	METAL DECK	1
F. ROGERS	LIVERMORE	INSULATION	1
LOVES + RIBETTI	SCOTTS VALLEY	ROOFING	1
XXXXXXXXXX (PT) CORNER COUNTERS GLASS	XXXXXXXXXX (PT) MONTAGUE	CLEANHEAD DRS	0.5
XXXXXXXXXX (PT) CORNER COUNTERS GLASS FACE DRYWALL	XXXXXXXXXX (PT) MONTAGUE CORNER	WINDOWS/ GEARED WALL ASSEMBLIES	0.5
XXXXXXXXXX (PT) APP HASTING	XXXXXXXXXX (PT) SANTA CLARA	DRYWALL	1
		PAINTING	1.5

**BID FORM - DOCUMENT 9
DESIGNATION OF SUBCONTRACTORS**

To comply with the requirements of the California Subletting and Subcontracting Fair Practices Act, bidder shall list the name and address of each Subcontractor, including D.B.E. Subcontractor to whom bidder proposes to Subcontract more than 1/2 of 1 percent of the work, and description and portions of the Work or services Subcontracted.

Attach additional copies of this form if more space is required.

<u>Name of Subcontractor</u>	<u>Business Address</u>	<u>Trade/Craft</u>	<u>% of Total Bid</u>
MARQUE FIRE PROTECTION	SACRAMENTO	FIRE PROTECTION	1
OC MCDONALD	SAN JOSE	PLUMBING	16
OC MCDONALD	SAN JOSE		
JM BERTK	SACRAMENTO	HAIR/FISHING	2
PETERSON HYDRAULICS	GARDENA	ELECTRICAL	7
PETERSON HYDRAULICS	GARDENA	VEHICLE LIFTS	3
N. BAY OIL	SAN RAFAEL	SHOP EQUIPMENT.	1
		ACUMINON	1
		OVERHEAD DOORS	1

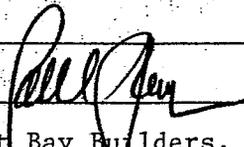
**BUY AMERICA CERTIFICATE
BID FORM – DOCUMENT 10**

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323 (j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date 10/17/06

Signature 

Company Name West Bay Builders, Inc.

Title Paul Thompson, President

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

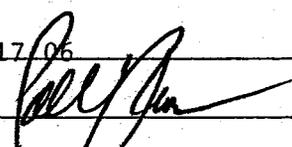
Title _____

Certification requirement for procurement of buses, other rolling stock and associated equipment.

Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date 10/17/06

Signature 

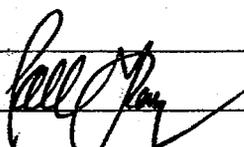
Company Name West Bay Builders, Inc.

Title Paul Thompson. President

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature 

Company Name _____

Title _____

**BID FORM – DOCUMENT 11
CERTIFICATION REGARDING LOBBYING**

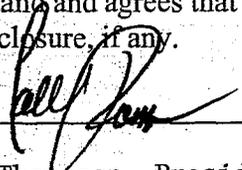
(To be submitted with each bid or offer exceeding \$100,000)

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person or making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions [as amended by “Government wide Guidance for New Restrictions on Lobbying,” 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. §1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.]

The Contractor, West Bay Builders, Inc., certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.



Signature of Contractor's Authorized Official

Paul Thompson, President Name and Title of Contractor's Authorized Official

10/17/06 Date

**BID FORM – DOCUMENT 11
CERTIFICATION REGARDING LOBBYING**

DISCLOSURE FORM TO REPORT LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

1. Type of Federal Action: <input type="checkbox"/> a. Contract b. Grant c. Cooperative agreement d. Loan e. loan guarantee f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application b. initial award c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing b. material change For Material Change Only: Year _____ Quarter _____ Date of Last Report:
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known Congressional District, if known:		5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime: Congressional District, if known:
6. Federal Department/Agency: Federal Action Number, if known:		7. Federal Program Name/Description: CFDA Number, if applicable: Award Amount, if known: \$
10a. Name and Address of Lobbying Entity (last name, first name, MI): (attach continuation sheet(s) SF-LLL-A, if necessary)		b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI):
11. Amount of Payment (check all that apply): \$ _____ <input type="checkbox"/> Actual <input type="checkbox"/> Planned	13. Type of Payment (check all that apply): <input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other, specify: _____	
12. Form of Payment (check all that apply): <input type="checkbox"/> Cash <input type="checkbox"/> in kind, specify nature _____ Value _____		
14. Brief description of Services Performed and Date(s) of Service, Including officer(s), employee(s), or Members(s) contacted, for Payment Indicated in Item 11: (attach Continuation Sheet(s) SF-LLL-A, if necessary)		
15. Continuation Sheet(s) SF-LLL-A attached: <input type="checkbox"/> Yes <input type="checkbox"/> No		

**BID FORM - DOCUMENT 11
CERTIFICATION REGARDING LOBBYING**

<p>16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each failure.</p>	<p>Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____</p>	
<p>Federal Use Only:</p>		<p>Authorized for Local Reproduction Standard Form - LLL</p>

**BID FORM - DOCUMENT 13
STATEMENT OF COMPLIANCE**

West Bay Builders, Inc. Company Name
250 Bel Marin Keys Boulevard, Building A, Novato, CA 94949 Street/Mailing Address
Novato, CA 94949 City/State/Zip Code
TAX ID. 68-0250401

1. PRIME CONTRACTOR

- The Bidder/Proposer is a CalTrans certified DBE under the CalTrans Uniform Certification Program.
Certification No. _____ Expiration Date _____
- The Bidder/Proposer has applied for DBE status through the CalTrans Uniform Certification Program.
Application Date _____ Status of application _____
- The Bidder/Proposer is not a CalTrans certified DBE under the CalTrans Uniform Certification Program.

2. SUB-CONTRACTOR (if proposed in bid or proposal)

Attach a separate sheet for each sub-contractor to be used in the performance of services under a bid specifying the sub-contractor DBE status as stated under section I listed above.

If not already registered, sub-contractors should access the following web site: [http://www.dot.ca.gov/hq/bep/Roster of Certifying Agencies 09-16-03.doc](http://www.dot.ca.gov/hq/bep/Roster_of_Certifying_Agencies_09-16-03.doc) for a list of DBE certifying government agencies to contact for information on how to become a certified DBE business. A W-9, Request for Taxpayer Identification Number and Certification is required to complete the process.

Prime Contractor's are requested to explain the DBE program and encourage sub contractors to apply for certification.

 _____ Date _____
Prime Signature
Paul Thompson, President

(Position/Title)

**BID FORM – DOCUMENT 13
STATEMENT OF COMPLIANCE**

West Bay Builders, Inc.
(Company Name)

(hereinafter referred to as "Prospective Contractor") hereby certifies that during the performance of this contract, contractor and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, disability, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et. seq.) and the applicable regulations promulgated thereunder (Cal. Admin. Code, Tit. 2, Section 7285.0 et. seq.) both of which are incorporated into this contract by reference and made a part hereof as if set forth in full. Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

I, Paul Thompson
(Name of Official)

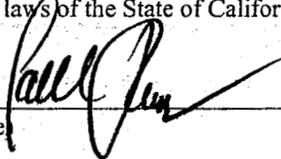
hereby swear that I am duly authorized to legally bind the Prospective Contractor to the above-described certification. I am fully aware that this certification, signed on

10/17/06

(Date)

in the County of Marin, is made under the penalty of perjury
(County)

under the laws of the State of California.


(Signature)

Paul Thompson
(Print)

President
(Title)

**BID FORM – DOCUMENT 14
APPRENTICESHIP EMPLOYMENT CERTIFICATION**

APPRENTICESHIP

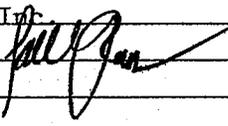
For each craft or trade utilized in performing the tasks required under this contract, each contractor or subcontractor performing work on this project shall employ apprentices on the project, in the ratios required by California statute, Section 1777.5 and 1777.6 of the Labor Code and the regulations of the California Apprenticeship Council, who are enrolled and participating in an apprenticeship program that has graduated apprentices annually for at least the past five (5) years. This requirement applies to any craft used on the project for which the State of California Department of Industrial Relations, Division of Apprenticeship Standards, has approved an apprenticeship program.

The graduation requirement for each of the preceding five (5) years shall not apply to any apprenticeship program not recognized or approved by the Department of Labor and/or Division of Apprenticeship Standards as an apprenticeable occupation for at least nine (9) years immediately prior to OCTOBER 17, 2006 providing that the program has graduated apprentices each year following the fifth anniversary of its recognition or approval.

In the event that there is no state-approved apprenticeship program that meets requirements of this provision for a particular craft or trade utilized under this contract for the MetroBase Project, the Contractor shall be exempt from the requirement of this provision for that craft or trade only.

APPRENTICESHIP EMPLOYMENT CERTIFICATION

Under the laws of the State of California, the undersigned declares, under penalty of perjury, compliance with the apprentice programs described in the Special Conditions for the workforce employed by Contractor or any subcontractor under the contract for Specification for the MetroBase Project.

Contractor: West Bay Builders, Inc.
By: Paul Thompson 
Date: 10/17/06
Title: President

**BID FORM – DOCUMENT 15
WORKERS' COMPENSATION CERTIFICATION**

I, as the Contractor for the MetroBase Project, am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract, if I am selected as the Contractor.

Contractor:	<u>West Bay Builders, Inc.</u>
By:	<u>Paul Thompson</u> 
Date:	<u>10/17/06</u>
Title:	<u>President</u>

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

The Bidder certifies that:

1. The Bidder has not employed in connection with services to be performed by the Contract a current or former METRO employee who was directly or indirectly involved with this procurement;
2. The Bidder has not employed in connection with the services to be performed by the Contract a current or former employee of RNL who was directly or indirectly involved in the preparation of the specifications or this IFB;
3. The Bidder did not receive any confidential information in connection with the services to be performed by the Contract; and
4. The Bidder has not employed as a lobbyist any former METRO Board Member or employee who left the METRO within the last twelve (12) months.

The Bidder further certifies that it has set forth below the names of all current and former METRO persons identified including METRO Board Members, employees it has or intends to employ in connection with the services to be performed under the Contract.

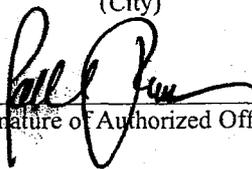
Current and/or former METRO Board Members, alternatives, or employees:

_____	_____
_____	_____
_____	_____
_____	_____

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Executed on 10/17, 2006, at Novato, California
(Date) (City) (State)

Paul Thompson
Typewritten or Printed Name


Signature of Authorized Official

President
Title

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

CONFLICT OF INTEREST CHECKLIST

All Bidders must respond to each of the following questions to determine whether any actual or perceived conflict of interest may exist. If any response has a "yes" answer, provide accurate and complete information for analysis.

1. Have you or any of your team member(s) or consultant(s) ever been employed by, or done work for, the METRO? Yes No

If your answer is "Yes", please provide the additional information.

- | | | | |
|----------------------------|------------------------------|-----------------------------|----------------|
| • Full-time employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Part-time employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • As-Needed employee | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Consultant | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |
| • Or other, please explain | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Name(s): _____ |

-
- Dates of Employment/consulting contract:

-
- In which department(s) did you work?

-
- Who was your supervisor(s)/who did you supervise?

-
- Please describe your job duties and responsibilities or consulting work for each METRO position held:

-
- Last date of employment or consultant contract:

-
2. Are any METRO Board Member(s) or any of their staff presently serving as officers, partners, or shareholders in your company? Yes No

If the answer is "Yes", please provide the additional information:

- Name(s) of Board Members:

-
- What is his/her position with your company?

-
- Percentage of ownership of company shares:

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

3. Are any of your former employee's or consultant's presently employed by the METRO? Yes No

If the answer is "Yes", please provide the additional information:

- Name(s) of each former employee:
-

- All titles of each former employee:
-

- Description of job duties:
-

- Dates of employment or date consultant worked for you:
-

4. In the preceding twelve months, has the Bidder/Proposer made, arranged or delivered any gift(s) to any METRO Board Member? Yes No

If the answer is "Yes", please provide the additional information:

- Name of Board Member receiving the gift:
-

- Value of the gift:
-

- Description of the gift:
-

- Date the gift was delivered:
-

5. In the preceding forty-eight (48) months, has your company made, arranged or delivered any campaign contributions to any METRO Board Member? Yes No

If the answer is "Yes", please provide the additional information:

- Name of Board Member receiving the contribution:
-

- Name of Board Member receiving contribution:
-

- Amount of the contribution:

**BID FORM – DOCUMENT 16
CONFLICT OF INTEREST STATEMENT**

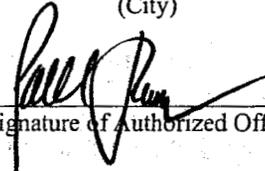
- Description of form of contribution (i.e. cash, check):

- Date the contribution was delivered:

- To whom was the contribution delivered:

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Executed on 10/17, 2006, at Novato, California
(Date) (City) (State)

Paul Thompson  President
Typewritten or Printed Name Signature of Authorized Official Title

WEST BAY BUILDERS, INC. (CONSOLIDATED)
&
AFFILIATES

COMBINED FINANCIAL STATEMENTS
AND SUPPLEMENTAL INFORMATION
For the year ended May 31, 2005

GAIDANO AND ASSOCIATES
CERTIFIED PUBLIC ACCOUNTANTS

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GAIDANO AND ASSOCIATES

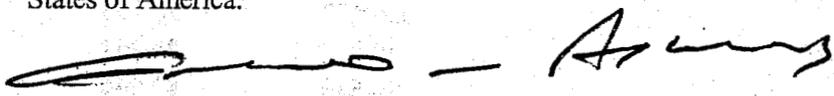
7 MT. LASSEN DRIVE, SUITE C-256
SAN RAFAEL, CALIFORNIA 94903

To the Board of Directors
WEST BAY BUILDERS, INC. (CONSOLIDATED)
& AFFILIATES
Novato, California

We have audited the accompanying combined balance sheet of **WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES** as of May 31, 2005, and the related combined statements of income and comprehensive income, changes in stockholders' equity, and cash flows for the year then ended. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of **WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES** as of May 31, 2005, and the results of their operations and their cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America.



San Rafael, California
September 15, 2005

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINED BALANCE SHEET
May 31, 2005

ASSETS

CURRENT ASSETS:

Cash and cash equivalents		\$ 10,646,615
Certificates of deposit (Note 2)		13,599,965
Receivables:		
Contracts	\$ 11,791,971	
Retention	1,728,382	
Other receivables (Note 3)	409,099	
Officer (Note 3)	200,000	
Employee advances	30,000	
Income tax refund	<u>900</u>	

Total Receivables 14,160,352

Costs and estimated gross profit in excess of billings on contracts in progress (Note 4)		2,406,275
Prepaid expenses and deposits		386,362
Investment in marketable securities (Note 5)		-
Investment in joint venture (Note 6)		220,140
Deferred tax asset - short-term (Note 16)		226,657
Cash value life insurance (Note 7)		<u>782,445</u>

Total Current Assets \$ 42,428,811

PROPERTY AND EQUIPMENT: (Note 8)

	<u>Cost</u>	<u>Accumulated Depreciation</u>
Construction equipment	\$ 2,057,561	\$ 990,374
Automotive equipment	1,056,467	720,193
Office furniture and equipment	140,210	94,251
Leasehold improvements	<u>244,636</u>	<u>81,545</u>

Total Property and Equipment \$ 3,498,874 \$ 1,886,363

Net Property and Equipment 1,612,511

NOTE RECEIVABLE (Note 9)		521,228
OTHER INVESTMENTS - AT COST (Note 10)		150,000
DEFERRED TAX ASSET - LONG-TERM (Note 16)		<u>410,901</u>

Total Assets \$ 45,123,451

See accompanying notes and accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINED BALANCE SHEET
May 31, 2005

LIABILITIES AND STOCKHOLDERS' EQUITY

CURRENT LIABILITIES:

Trade accounts and subcontractors payable	\$ 14,879,532
Subcontractor retentions payable	10,239,994
Accrued expenses	294,168
Income taxes payable	365,622
Billings in excess of costs and estimated gross profit on contracts in progress (Note 4)	6,409,118
Current maturity of long-term debt (Note 12)	<u>394,823</u>

Total Current Liabilities \$ 32,583,257

DEFERRED COMPENSATION (Note 7)	959,154
LONG-TERM DEBT, NET OF CURRENT MATURITY (Note 12)	<u>1,157,617</u>

Total Liabilities 34,700,028

STOCKHOLDERS' EQUITY:

Common stock (Note 13)	280,141
Additional paid-in capital	108,090
Retained earnings	10,035,192
Accumulated other comprehensive income	<u>-</u>

Total Stockholders' Equity 10,423,423

Total Liabilities and Stockholders' Equity \$ 45,123,451

See accompanying notes and accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINED STATEMENT OF INCOME AND COMPREHENSIVE INCOME
For the year ended May 31, 2005

CONTRACT REVENUE		\$ 95,253,618
DIRECT COSTS:		
Subcontractors	\$ 65,461,293	
Labor and labor burden	14,878,176	
Materials	3,966,275	
Equipment and other	<u>6,106,299</u>	
 Total Direct Costs		 <u>90,412,043</u>
 Gross Profit on Jobs		 4,841,576
 LOSS FROM JOINT VENTURE (Note 6)		 <u>(15,055)</u>
 Gross Profit From Contracting		 4,826,520
 GENERAL AND ADMINISTRATIVE EXPENSES		 <u>4,262,843</u>
 Income From Operations		 563,677
OTHER INCOME (EXPENSE):		
Interest and dividend income	315,528	
Discounts earned	2,379	
Loss on disposition of equipment	(5,793)	
Gain on sale of marketable securities	77,324	
Interest expense	<u>(96,455)</u>	
 Total Other Income (Expense)		 <u>292,983</u>
 Income Before Taxes		 856,660
 PROVISION FOR INCOME TAX EXPENSE (Note 16)		 <u>324,780</u>
 Net Income		 531,880
OTHER COMPREHENSIVE INCOME: (Note 15)		
Reclassification adjustment, net of tax		<u>(41,109)</u>
 Total Comprehensive Income		 <u>\$ 490,771</u>

See accompanying notes and accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINED STATEMENT OF CHANGES IN STOCKHOLDERS' EQUITY
For the year ended May 31, 2005

	Common Stock	Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total
Balance, June 1, 2004	\$ 280,141	\$ 108,090	\$ 9,503,312	\$ 41,109	\$ 9,932,652
Net income	-	-	531,880	-	531,880
Reclassification adjustment during the period	-	-	-	(41,109)	(41,109)
Balance, May 31, 2005	<u>\$ 280,141</u>	<u>\$ 108,090</u>	<u>\$ 10,035,192</u>	<u>\$ -</u>	<u>\$ 10,423,423</u>

See accompanying notes and accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINED STATEMENT OF CASH FLOWS
For the year ended May 31, 2005

CASH FLOWS FROM OPERATING ACTIVITIES:

Net Income	\$	531,880
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation	\$	847,476
Loss from joint venture		15,055
(Gain) on sale of marketable securities		(36,215)
Loss on disposition of equipment		5,793
(Increase) Decrease in:		
Contracts receivable		(3,445,493)
Costs and estimated gross profit in excess of billings on contracts in progress		2,254,930
Prepays and deposits		(122,343)
Employee advances		(29,196)
Income tax refund receivable		112,288
Interest income receivable		(21,228)
Cash value life insurance		(16,580)
Retention in escrow		(4,124,054)
Deferred income tax benefit		(211,826)
Increase (Decrease) in:		
Trade accounts and subcontractors payable		2,590,177
Accrued expenses		(966,299)
Billings in excess of costs and estimated gross profit on contracts in progress		3,673,164
Income taxes payable		316,186
Deferred compensation		177,003
Total adjustments		<u>1,018,838</u>
Net cash provided by operating activities		\$ 1,550,718

CASH FLOWS FROM INVESTING ACTIVITIES:

Acquisition of property and equipment	(236,488)	
Purchase of marketable securities	(79,331)	
Proceeds from sale of marketable securities	451,788	
Advances to joint venture	(20,536)	
Payments on loan to officer	499,039	
Increase in other receivable	167,419	
Purchase of certificate of deposit	(500,000)	
Increase in note receivable	<u>(521,228)</u>	
Net cash used by investing activities		(239,337)

CASH FLOWS FROM FINANCING ACTIVITIES:

Reduction of debt	<u>(413,459)</u>	
Net cash used by financing activities		<u>(413,459)</u>
Increase in cash		897,922

CASH AND CASH EQUIVALENTS, June 1, 2004

9,748,693

CASH AND CASH EQUIVALENTS, May 31, 2005

\$ 10,646,615

See accompanying notes and accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 1: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:

The following items comprise the significant accounting policies of **WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES** (the Corporation). The policies reflect industry practices and conform to generally accepted accounting principles.

Corporation's Activities and Operating Cycles:

WEST BAY BUILDERS, INC. (CONSOLIDATED) perform project management and general contracting work on public, private, and commercial projects throughout Northern California. Contracts are obtained primarily through competitive bidding. **WBB MANAGEMENT, INC.** is engaged in investment and employee leasing activities. **WEST BAY BUILDERS, LLC** is engaged in equipment leasing activities.

The length of the Corporation's construction contracts varies but is typically between one to two year periods. In accordance with normal practice in the construction industry, the Corporation includes asset and liability accounts relating to construction contracts, including deferred income taxes, in current assets and liabilities even when such amounts are realizable or payable over a period in excess of one year.

Principles of Consolidation and Combination:

The consolidated financial statements include the accounts of **WEST BAY BUILDERS, INC.** and its wholly owned subsidiary, **WBB CONSTRUCTION, INC.** **WEST BAY BUILDERS, INC.** and **WBB CONSTRUCTION, INC.** both have a May 31 year-end. All inter-company accounts and transactions have been eliminated in the consolidation process.

The combined financial statements include the accounts of **WEST BAY BUILDERS, INC. (CONSOLIDATED)**, **WEST BAY BUILDERS, LLC** and **WBB MANAGEMENT, INC.** Management believes that combined financial statements provide a more meaningful economic presentation since the three companies are under common management. **WBB MANAGEMENT, INC.** and **WEST BAY BUILDERS, LLC** both have a December 31 year-end. All inter-company accounts and transactions have been eliminated in the combination process.

Use of Estimates:

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 1: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES, Continued:

Cash and Cash Equivalents:

The Corporation considers all money market funds to be cash equivalents.

Accounts Receivable:

The Corporation bills its customers in accordance with contractual agreements, generally on a progressive basis as work is completed. Normal contracts receivable are due 30 days after the issuance of the invoice. Receivables past due more than 120 days are considered delinquent. Delinquent receivables are written off based on individual credit evaluation and specific circumstances of the owner. If amounts become uncollectible, they will be charged to operations when that determination is made. Contracts receivable are considered to be fully collectible at May 31, 2005; accordingly, no allowance for doubtful accounts has been set up. If amounts become uncollectible, they will be charged to operations when that determination is made. During the year ended May 31, 2005, \$ 748,689 has been written off and is included in job costs.

Marketable securities:

Marketable securities are comprised of equity securities classified as available-for-sale. These securities are recorded on the financial statements at fair value in accordance with SFAS No. 115, Accounting for Certain Investments in Debt and Equity Securities. The corresponding unrealized gain or loss in the fair market value in relation to cost is accounted for as a separate item in the stockholders' equity section of the balance sheet.

Revenue and Cost Recognition:

The Corporation recognizes revenues from long-term construction contracts on the percentage-of-completion method. Under this method, the completion percentage is measured by the proportion of cost incurred to date to total estimated cost for each contract. This method is used because management believes the cost-to-cost method to be the best available measure of progress on the contracts. Because of inherent uncertainties in estimating costs, it is at least reasonably possible that the estimates used will change in the near term.

Contract costs include all subcontractor, direct material and labor costs and those indirect costs related to contract performance. General and administrative costs are charged to expense as incurred. Provisions for estimated losses on uncompleted contracts are made in the period in which such losses are determined. Changes in job performance, job conditions, and estimated profitability, including those arising from contract penalty provisions and final contract settlements, may result in revisions to costs and income and are recognized in the period in which the revisions are determined. Profit incentives are included in revenues when their realization is reasonably assured. An amount equal to contract costs attributable to claims is included in revenue when realization is probable and the amount can be reliably estimated.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 1: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES, Continued:

Revenue and Cost Recognition, Continued:

The asset, "Costs and estimated gross profit in excess of billings on contracts in progress," represents revenue recognized in excess of amounts billed. The liability, "Billings in excess of costs and estimated gross profit on contracts in progress," represents billings in excess of revenue recognized.

Income Taxes:

The Corporation accounts for income taxes in accordance with SFAS No. 109, Accounting for Income Taxes. Deferred income tax assets and liabilities are computed annually for differences between the financial statement and tax basis of assets and liabilities that will result in taxable or deductible amounts in the future based on enacted tax laws and rates applicable to the periods in which the differences are expected to affect taxable income. Valuation allowances are established when necessary to reduce deferred tax assets to amounts expected to be realized. Income tax expense is the tax payable or refundable for the period plus or minus the change during the period in deferred tax assets and liabilities.

For income tax purposes, **WEST BAY BUILDERS, INC. & WBB CONSTRUCTION, INC.** reports income on the percent complete contract method of accounting. Under this method, billings and costs are accumulated during the period of construction and profits are recorded during the life of the contract.

For income tax purposes, **WBB MANAGEMENT, INC.** reports income on the cash method of accounting. **WBB MANAGEMENT, INC.** has elected to be taxed as an S corporation on its federal and California income tax returns. As an S corporation, **WBB MANAGEMENT, INC.** is generally not subject to federal income tax, and is subject to California income tax at a reduced rate of 1.5%. Accordingly, the provision and liability for income taxes reflect only California income tax at the reduced rate. Under these provisions, individual stockholders are taxed on their federal tax returns on their proportionate share of taxable income earned by **WBB MANAGEMENT, INC.** Effective for years beginning January 1, 2005, **WBB MANAGEMENT, INC.** has elected out of its S-status and is taxed at C-corporation tax rates. Accordingly, the provision for income taxes for activities after December 31, 2004 is determined using C-corporation tax rates.

WEST BAY BUILDERS, LLC is treated as a partnership for income tax purposes and as such, is not taxed for federal purposes. Limited liability companies, however, are subject to a minimum California franchise tax of \$ 800 plus fees if total income is in excess of \$ 250,000. Members are taxed separately on their distributive share of the partnership's income whether or not that income is actually distributed.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 1: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES, Continued:

Comprehensive Income:

The Corporation accounts for comprehensive income in accordance with SFAS No. 130, Reporting Comprehensive Income, which requires comprehensive income and its components to be reported when a company has items of comprehensive income. Comprehensive income includes net income plus other comprehensive income (i.e. certain revenues, expenses, gains and losses reported as separate components of stockholders' equity rather than in net income).

Compensated Absences:

Employees of the Corporation are entitled to paid vacation, paid sick days, and personal days off, depending on job classification, length of service and other factors. It is impractical to estimate the amount of compensation for future absences, and, accordingly, no liability has been recorded in the accompanying financial statements. The Corporation's policy is to recognize the costs of compensated absences when actually paid to employees.

Note 2: CERTIFICATES OF DEPOSIT:

Certificates of deposit in **WEST BAY BUILDERS, INC. (CONSOLIDATED)** represent pledged certificates of deposit in escrow bank accounts instead of retention withheld by owners. The certificates of deposit bear interest at current rates and are released upon successful completion of the contracts.

WBB MANAGEMENT, INC. has a certificate of deposit totaling \$ 500,000 that earns interest at 2.58%. The certificate matured in June 2005 and was renewed with a new maturity date of December 2005.

Note 3: RELATED PARTY TRANSACTIONS:

WEST BAY BUILDERS, INC. (CONSOLIDATED) has entered into contracts with limited liability companies and tenants-in-common investments in which the major stockholder is also a major investor and managing partner. These separate legal entities include outside partners and have independent construction financing and funds available to compensate **WEST BAY BUILDERS, INC. (CONSOLIDATED)** on a timely basis. Related party contracts include Job 984 - 490 Mendocino Avenue, Job 6-002 - Sweed School, Job 6-003 - Symphony Towers, and small jobs in progress. Amounts due from such related parties totaled \$ 1,362,007 at May 31, 2005 and are included in contracts receivable. The Corporation has collected \$ 1,032,217 from these related entities subsequent to May 31, 2005 and expects to collect the remaining balance in full.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 3: RELATED PARTY TRANSACTIONS, Continued:

Included in other receivables are amounts due from tenants-in-common interests in which the major stockholder is also a majority owner. Total outstanding from these related entities were \$ 331,520 at May 31, 2005. The Corporation has collected \$ 195,794 from these related entities subsequent to May 31, 2005 and expects to collect the remaining balance in full.

The Corporation has made advances to and on behalf of the Corporation's officer. The officer has made repayments to the Corporation during the year. Balance on the note accrues interest using applicable federal rates. Receivable from officer was \$ 200,000 at May 31, 2005.

Note 4: COSTS AND ESTIMATED GROSS PROFIT ON CONTRACTS IN PROGRESS:

Costs incurred on contracts in progress	\$ 168,921,666
Estimated gross profit to date	<u>11,667,332</u>
Contract revenue earned to date	180,588,998
Less billings to date	<u>184,591,841</u>
Excess of billings over revenue earned	<u>\$ (4,002,843)</u>

The excess of billings over revenue earned is included in the accompanying balance sheet under the following captions:

Costs and estimated gross profit in excess of billings on contracts in progress	\$ 2,406,275
Billings in excess of costs and estimated gross profit on contracts in progress	<u>(6,409,118)</u>
	<u>\$ (4,002,843)</u>

Note 5: MARKETABLE SECURITIES:

All available-for-sale securities were sold during the fiscal year. Therefore, the cost and fair market value of available-for-sale securities are zero at May 31, 2005.

Realized gains and losses are based on original cost, and are included in earnings. During the year ended May 31, 2005, sales proceeds and gross realized gains and losses on securities classified as available-for-sale were:

Sales Proceeds	<u>\$ 451,788</u>
Gross realized losses	<u>\$ 7,048</u>
Gross realized gains	<u>\$ 84,372</u>

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 6: INVESTMENT IN JOINT VENTURE:

The Corporation is a partner in a joint venture and accounts for this investment under the equity method. The Corporation is a 60% partner in a construction joint venture, Lawrence Construction Co. - West Bay Builders, Inc. - A Joint Venture. The joint venture provides for special allocations of income (loss) to the Corporation. Investment in joint venture is stated at cost because management believes this method most accurately reflects the investment.

Summarized financial information is as follows:

Results of Operations for the year ended May 31, 2005:

Contract revenue	\$	-
Direct costs		<u>(18,166)</u>
Gross loss from contracting		(18,166)
General & administrative expenses		(1,193)
Interest income		<u>4,304</u>
Net loss	\$	<u>(15,055)</u>
Corporation's share of joint venture loss	\$	(15,055)
Investment balance, June 1, 2004		214,659
Advances to joint venture		<u>20,536</u>
Investment balance, May 31, 2005	\$	<u>220,140</u>

Note 7: CASH VALUE LIFE INSURANCE AND DEFERRED COMPENSATION:

WEST BAY BUILDERS, INC. has a non-qualified deferred compensation arrangement with certain key employees under which future defined benefits are expected to be funded by individual split-dollar life insurance policies. The present value of future benefits will be accrued over a vesting schedule as provided in the agreement. Upon termination of the policy or death of the insured, **WEST BAY BUILDERS, INC.** will receive the unvested cash surrender value of the policy. Total amount accrued and vested under such agreement at May 31, 2005 was \$ 959,154.

The Corporation has paid cumulative premiums of \$ 941,086 and the balance sheet reflects the amount that could be realized by the Corporation from the surrender of the life insurance policies as of May 31, 2005.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 8: PROPERTY AND EQUIPMENT:

Property and equipment, carried at cost, are depreciated over the estimated useful life of the related asset. Depreciation is computed on the double-declining method for financial statement reporting purposes. Leasehold improvements are amortized over the life of the lease. Accelerated methods are used to recover the costs of the assets for federal and state income tax reporting purposes. Estimated useful lives are as follows:

	<u>Lives</u>
Construction equipment	5 Years
Automotive equipment	5 Years
Office furniture and equipment	5-7 Years
Leasehold improvements	3 Years

Depreciation charged to general and administrative expenses amounted to \$ 847,476 for the year ended May 31, 2005.

Note 9: NOTE RECEIVABLE:

The Corporation loaned \$ 500,000 to an investment partnership owned by a few of the Corporation's employees. The partnership invested the proceeds to the Symphony Tower development project in San Francisco, California which is a related party contract as discussed in Note 3. The note bears interest at 5% and accrues interest monthly. Interest and principal are due in July 2009. Interest accrued for the year ended May 31, 2005 was \$ 21,228.

Note 10: OTHER INVESTMENTS:

Other investments consist of an investment in a third party California limited liability company and are stated at cost that does not exceed estimated net realizable value at May 31, 2005.

Note 11: BANK LINE OF CREDIT:

The Corporation has a \$ 7,000,000 line of credit with a commercial bank. Advances on the line bear interest at 0.50 percentage point over the Base Commercial Loan Reference Rate index. The line expires on November 15, 2005 and is secured by inventory, accounts receivable, contract rights, equipment and the personal guarantee of the major stockholder. The line also requires the Corporation to maintain certain liquid assets, debt-equity ratios, tangible net worth, etc. There were no outstanding advances on the line of credit at May 31, 2005.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 12: LONG-TERM DEBT:

Long-term debt as of May 31, 2005 consists of the following:

	Interest Rate	Payable	
		Within One Year	After One Year
Notes payable – secured by vehicles, aggregate monthly principal and interest payments of \$ 15,959 due through October 2009	0.00% - 6.24%	\$ 163,610	\$ 216,290
Notes payable – secured by cranes, aggregate monthly principal and interest payments of \$ 23,066 due through July 2010	4.75% - 4.99%	231,213	941,327
		<u>\$ 394,823</u>	<u>\$ 1,157,617</u>

Aggregate maturities of principal, by year, are as follows:

2006	\$ 394,823
2007	345,097
2008	336,028
2009	226,358
2010	<u>250,134</u>
	<u>\$ 1,552,440</u>

Interest expense for the year ended May 31, 2005 on all debt was \$ 96,455 and is included in other income (expense).

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 13: COMMON STOCK:

	Common Stock
WEST BAY BUILDERS, INC.	
100,000 shares authorized; no par value;	
20,000 shares issued and outstanding	\$ 270,141
WBB MANAGEMENT, INC.	
1,000,000 shares authorized; no par value;	
2,000 shares issued and outstanding	10,000
	\$ 280,141

Note 14: OPERATING LEASE COMMITMENTS:

The Corporation leased office and warehouse space in Novato, California from a tenants-in-common interest in which its major stockholder is also an owner and managing partner. The lease expires March 31, 2007 and requires monthly payments of \$ 14,484. Total rent expense for the year ended May 31, 2005 of \$ 207,302 is included in general and administrative expenses.

Future minimum lease payments are as follows:

2006	\$	174,234
2007		164,010
Total	\$	338,244

Note 15: OTHER COMPREHENSIVE INCOME:

During the year ended May 31, 2005, the Corporation sold all of its securities classified as available-for-sale. The before tax and after tax amounts, as well as the tax (expense) benefit, are summarized below.

	Before Tax	Tax (Expense) Benefit	After Tax
Reclassification adjustment for gains included in net income	\$ (41,735)	\$ 626	\$ (41,109)

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 16: INCOME TAXES:

Income tax expense (benefit) consists of the following:

	West Bay Builders, Inc. (Consolidated)	WBB Management, Inc.	West Bay Builders, LLC	Combined Total
Current tax expense:				
Federal	\$ 244,758	\$ 177,013	\$ -	\$ 421,771
State	<u>69,320</u>	<u>70,169</u>	<u>800</u>	<u>140,289</u>
	<u>314,078</u>	<u>247,182</u>	<u>800</u>	<u>562,060</u>
Deferred tax expense (benefit):				
Federal	(55,015)	(135,093)	-	(190,108)
State	<u>(20,559)</u>	<u>(26,613)</u>	<u>-</u>	<u>(47,172)</u>
	<u>(75,574)</u>	<u>(161,706)</u>	<u>-</u>	<u>(237,280)</u>
	<u>\$ 238,504</u>	<u>\$ 85,476</u>	<u>\$ 800</u>	<u>\$ 324,780</u>

The tax effects of temporary differences and carry forwards that give rise to deferred tax assets and liabilities consist of the following:

Deferred tax assets:

Unrealized losses in cash value life insurance	\$ 122,899	
Excess of accumulated book depreciation over accumulated tax depreciation	8,228	
Deferred compensation	410,901	
Other	190,508	
Valuation allowance	<u>(51,671)</u>	
Total deferred tax asset		\$ 680,865
<u>Deferred tax liability:</u>		
State taxes		7,861
Other		<u>35,446</u>
Total deferred tax liability		<u>43,307</u>
Net deferred tax asset (liability)		637,558
Less: Short-term portion		<u>226,657</u>
Deferred tax asset - Long-term		<u>\$ 410,901</u>

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 16: INCOME TAXES, Continued:

The Corporation has established a valuation allowance to adjust its deferred tax asset to an amount that will more likely be realized. The net change in the total valuation allowance is as follows:

Beginning valuation allowance	\$ 45,627
Change in valuation allowance	<u>6,044</u>
Ending valuation allowance	<u>\$ 51,671</u>

Note 17: SUPPLEMENTAL CASH FLOW INFORMATION:

Cash paid during the year ended May 31, 2005 for:

Interest	\$ <u>96,445</u>
Income taxes	<u>\$ 87,918</u>
 Non-Cash Investing and Financing Activities:	
Acquisition of property and equipment	\$ 390,457
Less amount financed	<u>153,979</u>
Cash paid	<u>\$ 236,488</u>
 Gains included in other comprehensive income, net of tax	
	<u>\$ 41,109</u>

Note 18: CONCENTRATIONS OF CREDIT RISK:

Financial instruments, which potentially subject the Corporation to concentrations of credit risk, consist primarily of cash, retentions in escrow, and trade receivables.

The Corporation maintains its cash and retentions in escrow in accounts which at times may exceed federally insured limits. The Corporation has not experienced any losses in such accounts. The Corporation believes it is not exposed to any significant credit risk on cash and certificates of deposit. At May 31, 2005 the amount in excess of the federally insured limits totaled \$ 21,784,469.

As is customary in the industry, the Corporation grants credit to its customers, substantially all of whom are regional public, private and commercial entities located in California. In general, the Corporation does not require collateral in relation to these receivables. However, the Corporation may be provided certain protection under mechanic's lien on real property improved for private customers in the event of non-payment by such customers.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 19: PENSION PLAN:

WEST BAY BUILDERS, INC. (CONSOLIDATED) contributes to multi-employer pension plans for employees covered by collective bargaining agreements. These amounts are remitted monthly and included in construction labor costs. Contributions of \$ 583,823 were made to the plans for the year ended May 31, 2005.

WEST BAY BUILDERS, INC. also maintains a Simplified Employee Pension (SEP) Plan. Contributions to the plan for the year ended May 31, 2005 were \$ 242,029 and are included in direct costs and general and administrative expenses.

On March 8, 1999, **WBB MANAGEMENT, INC.** implemented an Employee Stock Ownership Plan (ESOP). Employees who complete 1,000 hours of service in a plan year and who have been employed for one year or longer are eligible for participation. Contributions to the plan are discretionary and are limited to 10% of eligible employee wages. Employees will be allocated shares based upon the ratio of covered compensation of each participant over the aggregate covered compensation of all participants. Shares totaling 2,000 have been allocated to ESOP participants. Contributions of \$ 42,000 have been accrued to the plan for the year ended May 31, 2005.

Note 20: CONTINGENCIES:

The Corporation is involved in various litigation matters that are normal to construction activities. Management is of the opinion that these litigation matters, except for the following, will not have a material effect on the financial statements.

Job 250 - Yerba Buena Island - W2 Foundations and Column:

WEST BAY BUILDERS, INC. is a defendant in lawsuits filed by two subcontractors for breach of contract based on alleged non-payments totaling \$ 914,983. The Corporation has filed countersuits against the subcontractors for breach of contract, negligence and express indemnity. These matters are set for trial and mediation. The Corporation believes the suits are without merit and intends to vigorously defend its position.

Job 248 - Yerba Buena Island Viaduct Retrofit and Maintenance Substation:

WEST BAY BUILDERS, INC. is a defendant in a lawsuit filed by a subcontractor for breach of contract based upon alleged non-payment in the amount of \$ 821,400 of which \$ 340,000 has been charged to contract costs in the accompanying financial statements. The Corporation has affirmative claims against the subcontractor for breach of contract for negligence, express indemnity and delay damages. The Corporation believes the suit is without merit and intends to vigorously defend its position.

See accountant's report.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
NOTES TO COMBINED FINANCIAL STATEMENTS
May 31, 2005

Note 21: CONTRACT BACKLOG:

The following schedule is a reconciliation of contract backlog representing signed contracts as of May 31, 2005:

Balance, June 1, 2004	\$ 109,238,924
New contracts and contract adjustments	<u>118,429,638</u>
Subtotal	227,668,562
Less contract revenue earned	<u>95,261,851</u>
Balance, May 31, 2005	<u>\$ 132,406,711</u>

See accountant's report.

GAIDANO AND ASSOCIATES

7 MT. LASSEN DRIVE, SUITE C-256
SAN RAFAEL, CALIFORNIA 94903

To the Board of Directors
WEST BAY BUILDERS, INC. (CONSOLIDATED)
& AFFILIATES
Novato, California

Our audit was conducted for the purpose of forming an opinion on the basic financial statements taken as a whole. The information on pages S2 through S8 is presented for purposes of additional analysis and is not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.



San Rafael, California
September 15, 2005

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINING BALANCE SHEET
May 31, 2005

	West Bay Builders, Inc. (Consolidated)	WBB Management, Inc.	West Bay Builders, LLC	Inter- company Eliminations	Combined Totals
ASSETS					
CURRENT ASSETS:					
Cash and cash equivalents	\$ 6,932,527	\$ 3,712,908	\$ 1,180	\$ -	\$ 10,646,615
Certificates of deposit	13,099,965	500,000	-	-	13,599,965
Receivables:					
Contracts	11,791,971	-	-	-	11,791,971
Retention	1,728,382	-	-	-	1,728,382
Other receivables	366,198	42,901	-	-	409,099
Officer	-	200,000	-	-	200,000
Employee advances	30,000	-	-	-	30,000
Income tax refund	-	-	900	-	900
Costs and estimated gross profit in excess of billings on contracts in progress	2,406,275	-	-	-	2,406,275
Prepaid expenses and deposits	386,362	-	-	-	386,362
Investment in marketable securities	-	-	-	-	-
Investment in joint venture	220,140	-	-	-	220,140
Deferred tax asset - short-term	57,862	168,795	-	-	226,657
Cash value life insurance	782,445	-	-	-	782,445
Total Current Assets	37,802,127	4,624,604	2,080	-	42,428,811
Property and equipment	1,948,644	-	1,550,230	-	3,498,874
Less accumulated depreciation	(1,286,941)	-	(599,422)	-	(1,886,363)
Net Property and Equipment	661,703	-	950,808	-	1,612,511
Loan to affiliates	-	4,334,442	-	(4,334,442)	-
Note receivable	-	521,228	-	-	521,228
Other investments - At cost	-	150,000	-	-	150,000
Deferred tax asset - long-term	410,901	-	-	-	410,901
Total Assets	\$ 38,874,731	\$ 9,630,274	\$ 952,888	\$ (4,334,442)	\$ 45,123,451

See accountant's report on supplemental information.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINING BALANCE SHEET
May 31, 2005

	West Bay Builders, Inc. (Consolidated)	WBB Management, Inc.	West Bay Builders, LLC	Inter- company Eliminations	Combined Totals
<u>LIABILITIES</u>					
<u>CURRENT LIABILITIES:</u>					
Trade accounts and subcontractors payable	\$ 14,879,532	\$ -	\$ -	\$ -	\$ 14,879,532
Subcontractor retentions	10,239,994	-	-	-	10,239,994
Accrued expenses	137,216	156,952	-	-	294,168
Income taxes payable	150,371	215,251	-	-	365,622
Billings in excess of costs and estimated gross profit on contracts in progress	6,409,118	-	-	-	6,409,118
Current maturity of long-term debt	163,610	-	231,213	-	394,823
Total Current Liabilities	31,979,841	372,203	231,213	-	32,583,257
Deferred compensation	959,154	-	-	-	959,154
Long-term debt, net of current maturity	216,290	-	941,327	-	1,157,617
Loan from affiliate	4,334,442	-	-	(4,334,442)	-
Total Liabilities	37,489,727	372,203	1,172,540	(4,334,442)	34,700,028
<u>STOCKHOLDERS' EQUITY:</u>					
Common stock	270,141	10,000	-	-	280,141
Additional paid-in capital	108,090	-	-	-	108,090
Retained earnings (losses)	1,006,773	9,248,071	(219,652)	-	10,035,192
Accumulated other comprehensive income	-	-	-	-	-
Total Stockholders' Equity	1,385,004	9,258,071	(219,652)	-	10,423,423
Total Liabilities and Stockholders' Equity	\$ 38,874,731	\$ 9,630,274	\$ 952,888	\$ (4,334,442)	\$ 45,123,451

See accountant's report on supplemental information.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINING STATEMENT OF INCOME AND COMPREHENSIVE INCOME
For the year ended May 31, 2005

	West Bay Builders, Inc. (Consolidated)	WBB Management, Inc.	West Bay Builders, LLC	Inter- company Eliminations	Combined Totals
REVENUE	\$ 95,253,618	\$ 1,708,287	\$ 289,553	\$ (1,997,840)	\$ 95,253,618
<u>DIRECT COSTS:</u>					
Subcontractors	65,461,293	-	-	-	65,461,293
Labor and labor burden	14,878,176	208,287	-	(208,287)	14,878,176
Materials	3,966,275	-	-	-	3,966,275
Equipment and other	6,106,299	-	-	-	6,106,299
Total Direct Costs	<u>90,412,043</u>	<u>208,287</u>	<u>-</u>	<u>(208,287)</u>	<u>90,412,043</u>
Gross Profit on Jobs	4,841,575	1,500,000	289,553	(1,789,553)	4,841,575
Loss from Joint Venture	<u>(15,055)</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>(15,055)</u>
Gross Profit from Contracting	4,826,520	1,500,000	289,553	(1,789,553)	4,826,520
General & Administrative Expenses	<u>4,335,316</u>	<u>1,221,006</u>	<u>496,074</u>	<u>(1,789,553)</u>	<u>4,262,843</u>
Income from Operations	<u>491,204</u>	<u>278,994</u>	<u>(206,521)</u>	<u>-</u>	<u>563,677</u>
<u>OTHER INCOME (EXPENSE):</u>					
Interest and dividend income	217,005	192,631	-	(94,108)	315,528
Discounts earned	2,379	-	-	-	2,379
Loss on disposition of equipment	(5,793)	-	-	-	(5,793)
Gain on sale of marketable securities	-	77,324	-	-	77,324
Interest expense	<u>(125,535)</u>	<u>-</u>	<u>(65,028)</u>	<u>94,108</u>	<u>(96,455)</u>
Total Other Income (Expense)	<u>88,056</u>	<u>269,955</u>	<u>(65,028)</u>	<u>-</u>	<u>292,983</u>
Income Before Taxes	579,260	548,949	(271,549)	-	856,660
PROVISION FOR INCOME TAXES	<u>238,504</u>	<u>85,476</u>	<u>800</u>	<u>-</u>	<u>324,780</u>
Net Income	340,756	463,473	(272,349)	-	531,880
Reclassification adjustment, net of tax	<u>-</u>	<u>(41,109)</u>	<u>-</u>	<u>-</u>	<u>(41,109)</u>
Total Comprehensive Income	<u>\$ 340,756</u>	<u>\$ 422,364</u>	<u>\$ (272,349)</u>	<u>\$ -</u>	<u>\$ 490,771</u>

See accountant's report on supplemental information.

WEST BAY BUILDERS, INC. (CONSOLIDATED) & AFFILIATES
COMBINING STATEMENT OF CHANGES IN STOCKHOLDERS' EQUITY
For the year ended May 31, 2005

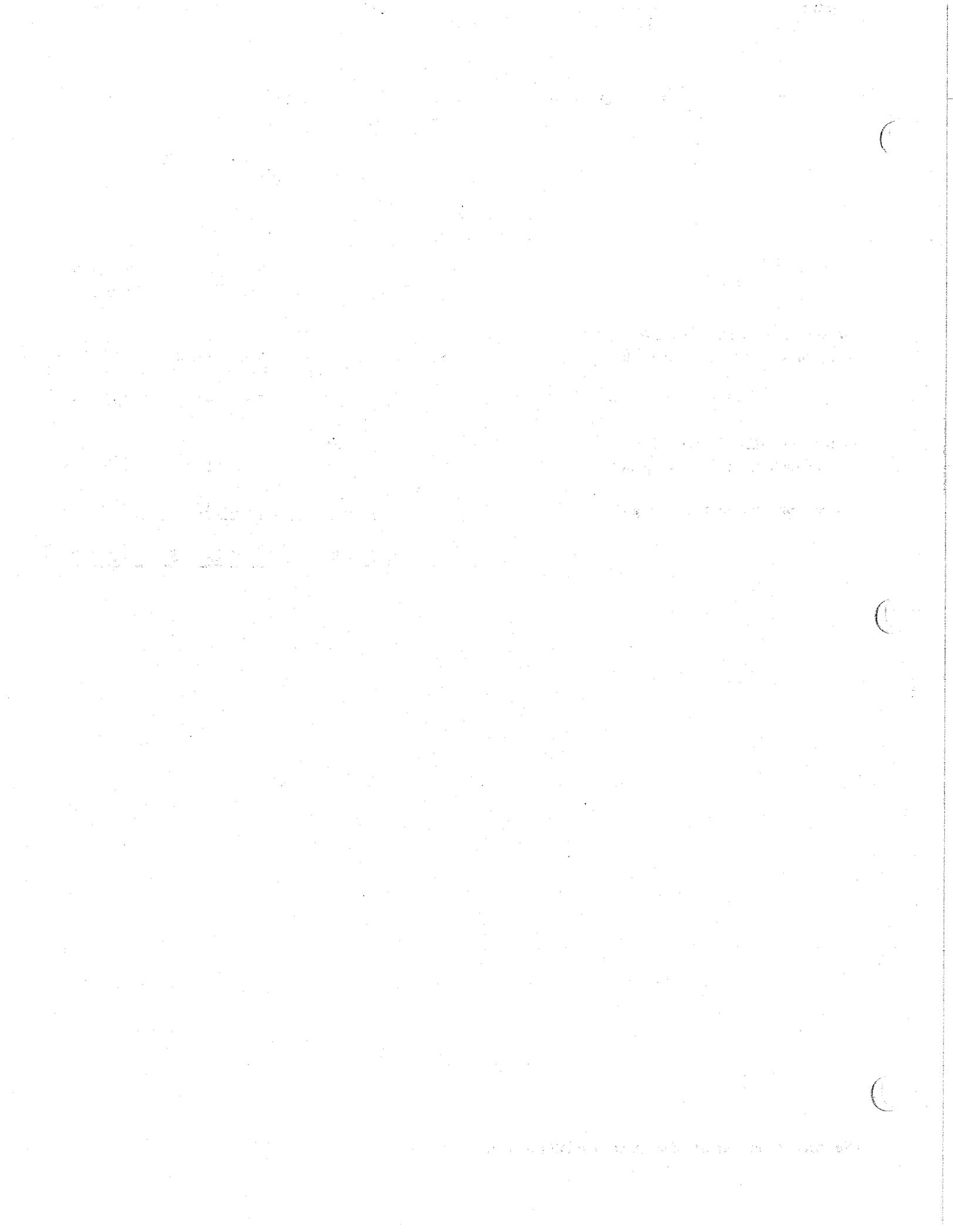
	West Bay Builders, Inc. (Consolidated)	WBB Management, Inc.	West Bay Builders, LLC	Combined Totals
Common stock	\$ 270,141	\$ 10,000	\$ -	\$ 280,141
Additional paid-in capital	108,090	-	-	108,090
Retained earnings:				
Beginning, June 1, 2004	666,017	8,784,598	52,697	9,503,312
Net income (loss)	<u>340,756</u>	<u>463,473</u>	<u>(272,349)</u>	<u>531,880</u>
Ending, May 31, 2005	<u>1,006,773</u>	<u>9,248,071</u>	<u>(219,652)</u>	<u>10,035,192</u>
Accumulated other comprehensive income (loss):				
Beginning, June 1, 2004	-	41,109	-	41,109
Reclassification adjustment during the period, net of tax	<u>-</u>	<u>(41,109)</u>	<u>-</u>	<u>(41,109)</u>
Ending, May 31, 2005	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Total Stockholders' Equity	<u>\$ 1,385,004</u>	<u>\$ 9,258,071</u>	<u>\$ (219,652)</u>	<u>\$ 10,423,423</u>

See accountant's report on supplemental information.

WEST BAY BUILDERS, INC. (CONSOLIDATED)
EARNINGS FROM CONSTRUCTION CONTRACTS
For the year ended May 31, 2005

	Contract Revenue	Direct Cost	Gross Profit
WEST BAY BUILDERS, INC.			
Construction contracts completed	\$ 6,878,902	\$ 6,922,483	\$ (43,581)
Construction contracts in progress	87,720,253	82,893,098	4,827,155
WBB CONSTRUCTION, INC.			
Construction contracts completed	-	13,815	(13,815)
Construction contracts in progress	654,463	582,647	71,816
	\$ 95,253,618	\$ 90,412,043	\$ 4,841,575

See accountant's report on supplemental information.



SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Robyn D. Slater, Human Resources Manager
SUBJECT: CONSIDERATION OF ADOPTION OF THE REVISED EQUAL EMPLOYMENT OPPORTUNITY PLAN

I. RECOMMENDED ACTION

Consider adoption of the Equal Opportunity Plan (EEO plan) for the Santa Cruz Metropolitan Transit District

II. SUMMARY OF ISSUES

- The Federal Transit Administration (FTA) requires METRO to submit an updated EEO plan every three years for review and approval as part of federal funding requirements.
- The FTA last approved METRO's EEO updated plan in 2003 and is now requiring METRO to submit an updated plan.
- METRO's plan has been updated based on workforce data through December 31, 2005.
- Changes have been made to update the plan using year 2000 census data and new EEO job categories.

III. DISCUSSION

The goal of METRO's EEO plan is to achieve a workforce that is represented in all occupational areas consistent with the percentage of females and minorities in the area workforce. The EEO plan examines METRO's accomplishments in recruiting and hiring in an effort to achieve parity in the workforce and identifies occupations that are underutilized and establishes employment goals for the updated plan.

METRO received 819 applications between January 1, 2003 and December 31, 2005. Of the applications received 34.2% of the applicants were females and 48.1% of the applicants were minorities. Of the 308 applicants determined to be qualified and placed on eligible lists, 36.4% were females and 43.2% were minorities. 41.4% of the applicants hired were female and 51.4% were minorities. While these percentages indicate that the recruitment and hiring efforts have been successful for the organization when compared to the overall area workforce, significant changes in workforce availability showed that continued efforts need to be made to bring up the percentages in several of the occupational job categories.

District appointment goals for the updated EEO plan include 53 females and 3 minorities. While METRO appointed more females and minorities than the goals from the previous EEO plan, the actual distribution to underutilized EEOC job categories was not met. This is in part due to the changes made in the job categories for the 2000 census. The next EEO plan will more accurately show hiring trends for the new job categories. One of the continued focuses will be the underutilization of females in the categories of professionals, craft workers, operatives (bus operators), laborers and helpers, and service workers. Our focus in minority recruitment will be for the job categories of officers and managers and professionals.

IV. FINANCIAL CONSIDERATIONS

Costs associated with the EEO plan activities are included in the Human Resources Department budget.

V. ATTACHMENTS

Attachment A: Equal Employment Opportunity Plan

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

EQUAL EMPLOYMENT OPPORTUNITY

PLAN



2006 -2008

BOARD OF DIRECTORS

MIKE ROTKIN, CHAIR
MARCELA TAVANTZIS, VICE CHAIR
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KIRBY NICOL
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DALE SKILLICORN
PAT SPENCE
MARK STONE
WES SCOTT

Leslie White, Secretary/General Manager
Robyn D. Slater, Human Resources Manager

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APPENDICES

- Appendix A Discrimination Complaint Procedure
- Appendix B Reasonable Accommodation Procedure
- Appendix C Policy Regarding Persons with Disabilities
- Appendix D Life Threatening Illness Policy
- Appendix E Sexual Harassment Policy (includes complaint procedure)
- Appendix F Race/Ethnic Identification
- Appendix G Description of EEOC Job Categories
- Appendix H Definitions

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I. EQUAL EMPLOYMENT OPPORTUNITY POLICY

The Santa Cruz Metropolitan Transit District (District) Board of Directors hereby reaffirms the Equal Employment Opportunity Policy and practices of planning, implementing and administering its employment policies, procedures and programs without regard to race, color, ancestry, national origin, religious creed, sex, medical condition or disability, age, marital status, veteran status, or sexual orientation. This policy applies to all employees and applicants for employment and to all aspects of employment including recruitment, appointment, training, promotion, transfer, termination, layoff, recall, compensation and discipline.

The District's goal is to achieve a workforce that is represented in all occupational areas and at all employment levels by minorities and females in numbers consistent with the percentage of these groups represented in the area workforce. Through the establishment and implementation of this policy, it is the intent of the District Board of Directors to actively support and comply with the following laws and regulations: the Equal Pay Act of 1963; Title VII of the Civil Rights Act of 1964, as amended; Civil Rights Act of 1991; the Urban Mass Transportation Act of 1964, as amended; the Age Discrimination in Employment Act of 1967; Section 504 of the Rehabilitation Act of 1973; the Vietnam Era Veterans Readjustment Assistance Act of 1974; Americans with Disabilities Act of 1990; and the California Fair Employment and Housing Act.

The District recognizes that a prohibition of discriminatory employment practices alone will neither achieve this goal nor insure equal employment opportunity, but that the District must take affirmative action in order to overcome the effects of discrimination. Such affirmative action steps are designed to remove and prevent artificial barriers to employment and the benefits of employment and to correct the effects of any past practices that may have created such barriers.

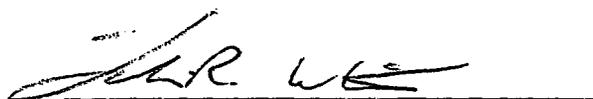
EEO POLICY STATEMENT FROM THE GENERAL MANAGER

As Secretary/General Manager of the Santa Cruz Metropolitan Transit District, I am committed to equal employment opportunity for all persons, regardless of race, color, ancestry, national origin, religious creed, sex, medical condition or disability, age, marital status, veteran status, sexual orientation and gender identification. I fully support the District's Equal Employment Opportunity Program, including the establishment of goals and timetables, in order to overcome the effects of past discrimination on minorities and females. The successful achievement of equal opportunity goals will provide benefits to the District through increased utilization, and development of previously underutilized human resources.

The responsibility for the implementation of the Equal Employment Opportunity Plan is assigned to the Human Resources Manager who serves as the District's Equal Employment Opportunity Officer. However, all District management share in the responsibility for achieving the District's employment goals and will have the specific task to assure equal employment opportunity compliance. The performance by management and supervisory personnel will be evaluated on the success of the Equal Employment Opportunity Program the same way as their performance on other District goals.

An employee or applicant for employment who perceives that his/her civil rights have been violated may file a complaint with the General Manager or the Equal Employment Opportunity Officer.

August 2006



Leslie R. White
Secretary/General Manager

III. DISSEMINATION OF THE EEO POLICY

The EEO (Equal Employment Opportunity) Policy and Plan shall be publicized and disseminated to District employees, applicants seeking employment and the general public as follows:

Internal Dissemination

- ◆ The EEO Policy and Statement from the General Manager shall be posted on at least one bulletin board at each District facility where employees work; included in the District's administrative procedures manual; distributed to each new employee; and maintained in the Human Resources Department for distribution to employees as requested.
- ◆ Copies of the EEO Plan shall be distributed to members of the Board of Directors; District management personnel; and departments to be available for review by District employees.
- ◆ Informational and training sessions shall be offered in order for District management and supervisory personnel to participate in equal employment opportunity compliance training.

External Dissemination

- ◆ Posters explaining State and Federal non-discrimination laws will be displayed at District work facilities.
- ◆ The EEO Plan will be maintained in the Human Resources Department for review by applicants and the general public.
- ◆ District employment opportunity flyers and application forms will state that the District is an equal opportunity employer.
- ◆ Human Resources Department staff will inform outreach referral sources of the District's EEO Policy and request that these sources actively refer qualified applicants from protected classes.

IV. OBJECTIVES OF THE EQUAL EMPLOYMENT OPPORTUNITY PLAN

- A. To ensure equal employment opportunity in District employment, including recruitment, appointment, compensation, training, promotion, transfer, termination, layoff, recall and discipline.
- B. To recruit, appoint and promote qualified minorities and females in order to achieve a workforce representative of minorities and females in the area workforce.
- C. To achieve specific goals and timetables to correct underutilization of minorities and females.
- D. To ensure that the District does not discriminate against individuals based on race, color, ancestry, or national origin, religious creed, sex, medical condition (including life threatening illnesses) or disability, age, marital status, veteran status, or sexual orientation.
- E. To investigate and respond to complaints of discrimination and harassment and take corrective action when necessary.
- F. To ensure dissemination of the EEO Policy both internally and externally.
- G. To develop effective monitoring and reporting systems to assess program compliance and ensure that District employment procedures do not discriminate against protected classes.

V. EQUAL EMPLOYMENT OPPORTUNITY RESPONSIBILITIES

In order to implement all aspects of the EEO Plan, responsibilities shall be as follows:

Board of Directors

- To adopt the District's EEO Policy Statement and Plan.
- To publicly support the Equal Employment Opportunity Plan.
- To approve revisions and modifications to the Plan.
- To monitor Equal Employment Opportunity progress to ensure commitment by District management.

General Manager

- To allocate adequate financial and staff resources to implement an effective Plan.
- To evaluate managers' performance in meeting departmental EEO goals.

Equal Employment Opportunity Officer

- To update the Equal Employment Opportunity Plan every three years and submit the updated Plan to the Board of Directors.
- To submit the District's Equal Employment Opportunity Plan to FTA for approval every three years.
- To develop, recommend and implement the Equal Employment Opportunity Plan and internal and external communication procedures.
- To collect and analyze employment data and identify problem areas.
- To design, implement and monitor reporting systems to measure program effectiveness and to determine where further action is needed.
- To contact minority, disabled, and women's organizations, community groups and educational institutions to refer qualified minority, disabled, and female applicants for employment.
- To ensure that current legal information affecting Equal Employment Opportunity is communicated to appropriate District personnel.
- To ensure that employment practices are job related and free of adverse impact and adverse treatment.

- To investigate complaints of discrimination and harassment and recommend corrective action when necessary.
- To identify and recommend Equal Employment Opportunity training to supervisory and management personnel.
- To develop and recommend procedures and practices that ensure equal employment opportunity and affirmative action in all aspects of employment activities.
- To meet with and obtain input from an Equal Employment Opportunity Committee composed of employee representatives.

Managers and Supervisory Personnel

- To support and comply with the Equal Employment Opportunity Plan.
- To work with the Equal Employment Opportunity Officer to identify problem areas and review department goals.
- To monitor appointments together with Equal Employment Opportunity goals.
- To maintain a discrimination free work environment and to take immediate action to investigate and correct inappropriate behavior of subordinates.

Equal Employment Opportunity Committee

- To assist the Equal Employment Opportunity Officer in promoting an understanding and acceptance of the Plan.
- To express the concerns of District employees in terms of Equal Employment Opportunity and assist in resolving such concerns.
- To assist in Equal Employment Opportunity program activities.

All Employees

- To support and comply with the Equal Employment Opportunity Policy and Plan.

VI. REVIEW OF 2003 - 2005 STATISTICS

RECRUITMENTS

Chart 1 presents the applicant data for recruitments from January 1, 2003 through December 31, 2005. Of the 819 applications received, females comprised 34.2% (280) and minorities comprised 48.1% (394). A total of 308 persons were placed on eligible lists for all positions recruited, 36.4% (112) were female and 43.2% (133) were minorities. Of the 140 appointments made, 41.4% (72) were female and 51.4% (72) were minorities. These percentages show an increase in the percentage of females and minorities hired since the last report was filed. The recruitment pool for females in the new category of Operatives has increased dramatically which will affect the District's future recruitment efforts.

Chart 1 has been adapted to reflect the new EEO 1 job categories and is discussed below:

- **Officials and Managers:** 95 applications were received, 21 persons were placed on eligible lists, and 4 individuals were hired. Females constituted 28.4% and minorities constituted 24.4% of the total applications received. Of the individuals hired 75% were female, 75% were minorities and 50% were over forty.
- **Professionals:** 62 applications were received, 29 persons were placed on eligible lists, and 4 individuals were hired. Females comprised 19.4% and minorities comprised 30.6% of the applications received. Of the individuals hired, females constituted 25% and 25% of the hires were over forty.
- **Administrative Support Workers:** 193 applications were received, 88 persons were placed on the eligible list and 26 individuals were hired. Females comprised 67.9% and minorities comprised 40.9% of the applications received. Of the individuals hired, females constituted 88.5%, 42.3% were minority and 53.8% were over forty.
- **Craft Workers:** 48 applications were received, 17 persons were placed on the eligible list and 8 individuals were hired. Females constituted 4.2% and minorities constituted 52.1% of the total applications received. Of the individuals that were hired 62.5% were minority and 62.5% were over forty.
- **Operatives:** 315 applications were received, 133 persons were placed in the eligible list and 89 individuals were hired. Females constituted 26.3% and minorities constituted 55.6% of the applications received. Of the individuals hired 32.6% were females, 50.6% were minorities and 55.1% were over forty.
- **Laborers and Helpers:** 75 applications were received, 12 individuals were placed on the eligible lists, and 1 individual was hired. Females constituted 12% and minorities constituted 72% of the total applications received. Of the individuals hired, 58.3% were minorities, and 25% were over 40.
- **Service Workers:** 31 applications were received, 8 individuals were placed on the eligible list, and 7 individuals were hired. Females constituted 51.6% and minorities constituted 48.4% of the total applications received. Of the individuals hired, 28.6% were female and 85.7% were minorities and 28.6% were over 40.

CHART 1
RECRUITMENT STATISTICS
 January 1, 2003 to December 31, 2005

<u>EEOC JOB CATEGORY</u>	<u>RECRUITMENT NUMBERS</u>	FEMALE		MINORITY		DISABLED		40 PLUS		
		<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	
Officials and Managers										
Applications Received	95	27	28.4%	27	28.4%	2	2.1%	69	72.6%	
Applicants Placed on Eligible List	21	8	38.1%	6	28.6%	0	0.0%	15	71.4%	
Applicants Hired	4	3	75.0%	3	75.0%	0	0.0%	2	50.0%	
Professionals										
Applications Received	62	12	19.4%	19	30.6%	1	1.6%	35	56.5%	
Applicants Placed on Eligible List	29	9	31.0%	9	31.0%	0	0.0%	25	86.2%	
Applicants Hired	4	1	25.0%	0	0.0%	0	0.0%	1	25.0%	
Administrative Support Workers										
Applications Received	193	131	67.9%	79	40.9%	1	0.5%	96	49.7%	
Applicants Placed on Eligible List	88	60	68.2%	33	37.5%	0	0.0%	49	55.7%	
Applicants Hired	26	23	88.5%	11	42.3%	0	0.0%	14	53.8%	
Craft Workers										
Applications Received	48	2	4.2%	25	52.1%	0	0.0%	27	56.3%	
Applicants Placed on Eligible List	17	1	5.9%	5	29.4%	0	0.0%	9	52.9%	
Applicants Hired	8	0	0.0%	5	62.5%	0	0.0%	5	62.5%	
Operatives										
Applications Received	315	83	26.3%	175	55.6%	0	0.0%	183	58.1%	
Applicants Placed on Eligible List	133	31	23.3%	67	50.4%	0	0.0%	67	50.4%	
Applicants Hired	89	29	32.6%	45	50.6%	0	0.0%	49	55.1%	
Laborers and Helpers										
Applications Received	75	9	12.0%	54	72.0%	0	0.0%	27	36.0%	
Applicants Placed on Eligible List	12	0	0.0%	7	58.3%	0	0.0%	3	25.0%	
Applicants Hired	2	0	0.0%	2	100.0%	0	0.0%	0	0.0%	
Service Workers										
Applications Received	31	16	51.6%	15	48.4%	0	0.0%	4	12.9%	
Applicants Placed on Eligible List	8	3	37.5%	6	75.0%	0	0.0%	1	12.5%	
Applicants Hired	7	2	28.6%	6	85.7%	0	0.0%	2	28.6%	
TOTAL										
Applications Received	819	280	34.2%	394	48.1%	4	0.5%	441	53.8%	
Applicants Placed on Eligible List	308	112	36.4%	133	43.2%	0	0.0%	169	54.9%	
Applicants Hired	140	58	41.4%	72	51.4%	0	0.0%	73	52.1%	

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- There were nineteen recruitments for positions in the category of Service Maintenance (Bus Operators excluded). 161 applications were received, 90 persons were placed on the eligible list, and 21 individuals were hired. Females constituted 9.3% (15) and minorities constituted 54.7% (88) of the total applications received. Of the 13 individuals hired, 4.8% (1) were female and 38.1% (8) were minorities.

APPOINTMENTS

The following figures illustrate changes in the percentage of District appointments from 1996 to 2005. These figures represent the number of persons from new appointments, internal promotions, re-employment from layoff, return from furlough, provisional appointments, and demotions.

CHART 2

APPOINTMENT PERCENTAGES

ETHNICITY OR GENDER	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	DISTRICT WORK FORCE	AREA WORK FORCE
WHITE	56.3%	72.2%	55.2%	58.5%	66.7%	59.6%	74.3%	57.1%	42.5%	55.3%	53.8	86.7%
HISPANIC	28.1%	11.1%	24.1%	29.2%	23.5%	38.3%	22.9%	35.7%	39.7%	40.4%	34.3	7.9%
BLACK	6.3%	16.7%	13.8%	10.8%	2.0%	0.0%	2.9%	0.0%	6.8%	4.3%	6.9%	0.7%
ASIAN/ PACIFIC ISLANDER	0.0%	0.0%	6.9%	1.5%	5.9%	0.0%	0.0%	7.1%	6.8%	0.0%	3.1%	4.2%
AMERICAN INDIAN/ ALASKAN	9.4%	0.0%	0.0%	0.0%	2.0%	2.1%	0.0%	0.0%	4.1%	0.0%	1.9%	0.4%
TOTAL MINORITIES	43.8%	27.8%	44.8%	41.5%	33.3%	40.4%	25.7%	25.7%	42.9%	57.5%	46.2%	13.2
TOTAL FEMALE	37.5%	44.4%	20.7%	30.8%	35.3%	21.3%	40.0%	40.0%	7.1%	53.4%	33.3%	49.5%

SEPARATIONS/ TERMINATIONS FOR CAUSE

Chart 3 provides the number of total separations and terminations for cause from January 1, 2003 through December 31, 2005 by ethnicity and gender. The percentages for each category are compared with the District workforce percentages. It appears that the percentage of Black and Asian/Pacific Islanders that separated or were terminated for cause are high in comparison to the total workforce. However, this is due to the low number of total employees in that category. Overall the District still has a higher number of employees in these categories than the area availability percentage.

CHART 3
2003 - 2005 SEPARATIONS

Ethnicity/Gender	Separations #	Separations %	Terminations #	Terminations %	Workforce %
White	50	58.8%	4	44.4%	53.8%
Hispanic	23	27.1%	3	33.3%	34.3%
Black	4	4.7%	2	22.2%	6.9%
Asian/Pacific Is	6	7.1%	0	0%	3.1%
Amer. In/Alaskan	2	2.4%	0	0%	1.9%
Total Minorities	35	41.2%	5	55.6%	46.2%
Total Females	28	32.9%	2	22.2%	33.3%
Total	85		9		

CHART 3-B

January 1, 2003 to December 31, 2005 PROMOTIONS

<u>POSITION</u>	<u>EMPLOYEES PROMOTED</u>
Accounting Specialist	1 WHT (F)
Admin Services Coord	1 WHT (F)
Bus Operator	1 HIS (M)
Fac Maint Supervisor	1 WHT (M)
FM Lead Mechanic	1 API (M)
FM Lead Mechanic	1 HIS (M)
FM Lead Mechanic	2 WHT (M)
FM Mechanic II	1 HIS (M)
FM Mechanic II	2 WHT (M)
Human Res Manager	1 WHT (F)
Maintenance Manager	1 WHT (M)
Safety & Training Coord	1 WHT (M)
Sr. Acctg Technician	1 AIA (F)
Sup of Rev Coll	1 WHT (F)
Sys Administrator	1 WHT (M)
Transit Supervisor	1 BLK (M)
Transit Supervisor	1 HIS (M)
Transit Supervisor	2 WHT (F)
Transit Supervisor	3 WHT (M)
Veh Serv Wkr II	3 HIS (M)

Ethnicity/Gender	Promotions #	Promotions %	District Workforce
White	17	63%	53.8%
Hispanic	7	25.9%	34.3%
Black	1	3.7%	6.9%
Asian/Pacific Is	1	3.7%	3.1%
Amer. In/Alaskan	1	3.7%	1.9%
Total Minorities	10	37%	46.2%
Total Females	7	25.9%	33.3%
Total	27		

VII. WORKFORCE UTILIZATION ANALYSIS

Workforce utilization analyses have been prepared in Charts 4 and 5 to determine where underutilization of protected classes exists in the District.

The current census data provides the percentages of availability of minorities and females within each EEOC job category in the labor force. The data provides a "utilization analysis" which consists of an analysis of the major EEOC job categories being underutilized when compared to their availability in the Santa Cruz County labor force.

The California Department of Fair Employment and Housing has required that an employer may not use the general labor force availability data for minorities and females. Instead we must use the County's availability percentages as broken down by ethnicity and females for each EEOC job category to establish the appointment goals listed in Chart 8.

Chart 4 shows the number and percent of protected class employees, as of December 31, 2005, in the District's workforce system-wide and by department, classified by EEOC job category. Chart 5 shows the distribution of employees by job classification in each EEOC job category by gender and ethnicity and lists the salary range for each job classification.

District-Wide Analysis

Underutilization

In reviewing the System Wide Chart 4 females have the most significant underutilization in the areas of: Professionals, Bus Operators, Laborers and Helpers and Service workers. In reviewing the Chart from the last EEOC report the reason females show such a large discrepancy is not due to the change in the District's workforce, but the increase in the availability of females in the categories mentioned. The percentage of female bus operators from the 1990 census was 18.1%; in the 2000 census that percentage had risen to 51.5%. In the area of Professionals the chart shows a 27.3% underutilization and for Service Workers a 39.5% underutilization, however, there are only 9 employees in the Professional category and 11 in the Service Worker category. In these areas a small change will significantly impact the percentage of underutilizations.

Total Minorities

Minorities represent 41.0% of the District's workforce, as compared to 30.3% of the area workforce. Females represent 33.3% of the District's workforce, as compared to 45.3% of the area workforce.

District-Wide Workforce Changes

A summary of District-wide workforce changes over the past ten years appears below:

	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>% Change 1996- 2005</u>
Females	31.3	31.6	34.1	31.7	30.4	29.6	29.4	Not available	33.3		+2.0
Hispanics	21.2	20.2	19.7	22.0	23.7	25.7	28.7		"	33.6	+12.4
Asian/Pacific Islanders	3.8	3.9	4.5	4.0	4.9	4.7	3.6		"	3.1	- 0.8
Blacks	6.3	6.7	7.9	7.8	6.4	5.9	6.7		"	17.0	+11.3
American Indian/ Alaskan Natives	2.8	2.8	2.1	1.9	1.8	2.1	2.0		"	2.0	- 0.8
Total Minorities	30.3	31.7	31.6	34.1	33.6	34.2	35.7		"	47.7	+ 17.7

As indicated in the above table, the District has experienced a 17.7% increase in its representation of minority employees since 1996. There has also been a significant increase in the percentage of Hispanic and Black employees. Attention will continue to be given to the recruitment of qualified female and minority applicants.

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CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 SYSTEM WIDE REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ ALASKAN NATIVE				
	TOTAL EMP	WORK FORCE	UNDER		WORK FORCE	UNDER															
			% AVAIL	% UTILIZATION		% AVAIL	% UTILIZATION														
1) OFFICIALS & MANAGERS	12	5	38.6	0	0.0	0	5.7	1	5.7	0	6.3	1	6.3	1	3.6	0	0.0	0	0.4	0	0.4
2) PROFESSIONALS	9	2	49.5	2	27.3	0	7.9	1	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	0.4	0	0.4
3) TECHNICIANS	2	2	52.1	0	0.0	0	16.0	0	16.0	0	1.7	0	1.7	0	4.6	0	4.6	0	0.2	0	0.2
5) ADMINISTRATIVE SUPPORT	44	38	76.5	0	0.0	12	18.7	0	0.0	2	1.3	0	0.0	1	3.0	0	0.0	1	0.5	0	0.0
6) CRAFT WORKER	28	0	4.8	1	4.8	8	22.2	0	0.0	1	0.6	0	0.0	2	1.3	0	0.0	0	0.5	0	0.5
7) OPERATIVES (NON BUS-OP)	43	19	30.6	0	0.0	21	48.8	0	0.0	2	1.0	0	0.0	2	3.1	0	0.0	1	0.3	0	0.0
BUS OPERATORS	156	37	51.5	43	27.8	53	26.5	0	0.0	14	1.5	0	0.0	3	1.5	0	0.0	4	0.0	0	0.0
8) LABORERS AND HELPERS	13	1	24.0	2	16.3	10	67.8	0	0.0	1	0.5	0	0.0	0	1.5	0	1.5	0	0.6	0	0.6
9) SERVICE WORKERS	11	2	57.7	4	39.5	5	31.1	0	0.0	2	1.2	0	0.0	1	4.0	0	0.0	0	0.5	0	0.5
TOTALS	318	106		52		109		2		22		1		10		0		6		0	

13.917

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 ADMINISTRATION REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER			AMERICAN INDIAN/ALASKAN NATIVE					
	TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	UNDER		TOTAL EMP	UNDER				
			% UTILIZATION	#			% UTILIZATION	#			% UTILIZATION	#		% UTILIZATION	#		% UTILIZATION	#			
1) OFFICIALS & MANAGERS	3	0	38.6	1	38.6	0	5.7	0	5.7	0	6.3	0	6.3	1	3.6	0	0.0	0	0.4	0	0.4
2) PROFESSIONALS	1	0	49.5	0	49.5	0	7.9	0	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	0.4	0	0.4
3) TECHNICIANS	1	1	52.1	0	0.0	0	16.0	0	16.0	0	1.7	0	1.7	0	4.6	0	4.6	0	0.2	0	0.2
5) ADMINISTRATIVE SUPPORT	3	2	76.5	0	0.0	0	18.7	1	18.7	0	1.3	0	1.3	0	3.0	0	3.0	0	0.5	0	0.5
6) CRAFT WORKER	0	0	4.8	0	0.0	0	22.2	0	0.0	0	0.6	0	0.0	0	1.3	0	0.0	0	0.5	0	0.0
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.3	0	0.0
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.6	0	0.0
9) SERVICE WORKERS	0	0	57.7	0	0.0	0	31.1	0	0.0	0	1.2	0	0.0	0	4.0	0	0.0	0	0.5	0	0.0
TOTALS	8	3		1		0		1		0		0		1	0		0		0		0

13.a18

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 FINANCE REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ALASKAN NATIVE			
	TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER	
			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION
1) OFFICIALS & MANAGERS	2	2	38.6	0 0.0	0	0	5.7	0 5.7	0	0	6.3	0 6.3	0	0	3.6	0 3.6	0	0	0.4	0 0.4
2) PROFESSIONALS	0	0	49.5	0 0.0	0	0	7.9	0 0.0	0	0	0.7	0 0.0	0	0	4.2	0 0.0	0	0	0.4	0 0.0
3) TECHNICIANS	0	0	52.1	0 0.0	0	0	16.0	0 0.0	0	0	1.7	0 0.0	0	0	4.6	0 0.0	0	0	0.2	0 0.0
5) ADMINISTRATIVE SUPPORT	4	4	76.5	0 0.0	0	0	18.7	1 18.7	0	0	1.3	0 1.3	0	0	3.0	0 3.0	0	0	0.5	0 0.5
6) CRAFT WORKER	0	0	4.8	0 0.0	0	0	22.2	0 0.0	0	0	0.6	0 0.0	0	0	1.3	0 0.0	0	0	0.5	0 0.0
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0 0.0	0	0	48.8	0 0.0	0	0	1.0	0 0.0	0	0	3.1	0 0.0	0	0	0.3	0 0.0
BUS OPERATORS	0	0	51.5	0 0.0	0	0	26.5	0 0.0	0	0	1.5	0 0.0	0	0	1.5	0 0.0	0	0	0.0	0 0.0
8) LABORERS AND HELPERS	0	0	24.0	0 0.0	0	0	67.8	0 0.0	0	0	0.5	0 0.0	0	0	1.5	0 0.0	0	0	0.6	0 0.0
9) SERVICE WORKERS	0	0	57.7	0 0.0	0	0	31.1	0 0.0	0	0	1.2	0 0.0	0	0	4.0	0 0.0	0	0	0.5	0 0.0
TOTALS	6	6		0	0		1	0	0	0		0	0	0	0	0	0	0		

13.a19

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 CUSTOMER SERVICE REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ALASKAN NATIVE			
	TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER	
			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION
1) OFFICIALS & MANAGERS	0	0	38.6	0 0.0	0	0	5.7	0 0.0	0	0	6.3	0 0.0	0	0	3.6	0 0.0	0	0	0.4	0 0.0
2) PROFESSIONALS	0	0	49.5	0 0.0	0	0	7.9	0 0.0	0	0	0.7	0 0.0	0	0	4.2	0 0.0	0	0	0.4	0 0.0
3) TECHNICIANS	0	0	52.1	0 0.0	0	0	16.0	0 0.0	0	0	1.7	0 0.0	0	0	4.6	0 0.0	0	0	0.2	0 0.0
5) ADMINISTRATIVE SUPPORT	6	6	76.5	0 0.0	4	4	18.7	0 0.0	0	0	1.3	0 1.3	0	0	3.0	0 3.0	0	0	0.5	0 0.5
6) CRAFT WORKER	0	0	4.8	0 0.0	0	0	22.2	0 0.0	0	0	0.6	0 0.0	0	0	1.3	0 0.0	0	0	0.5	0 0.0
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0 0.0	0	0	48.8	0 0.0	0	0	1.0	0 0.0	0	0	3.1	0 0.0	0	0	0.3	0 0.0
BUS OPERATORS	0	0	51.5	0 0.0	0	0	26.5	0 0.0	0	0	1.5	0 0.0	0	0	1.5	0 0.0	0	0	0.0	0 0.0
8) LABORERS AND HELPERS	0	0	24.0	0 0.0	0	0	67.8	0 0.0	0	0	0.5	0 0.0	0	0	1.5	0 0.0	0	0	0.6	0 0.0
9) SERVICE WORKERS	0	0	57.7	0 0.0	0	0	31.1	0 0.0	0	0	1.2	0 0.0	0	0	4.0	0 0.0	0	0	0.5	0 0.0
TOTALS	6	6		0	4	4		0	0	0		0	0	0		0	0	0		0

13. a20

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 HUMAN RESOURCES REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER			AMERICAN INDIAN/ ALASKAN NATIVE					
	TOTAL EMP	WORK FORCE	UNDER UTILIZATION		TOTAL EMP	WORK FORCE	UNDER UTILIZATION		TOTAL EMP	WORK FORCE	UNDER UTILIZATION		TOTAL EMP	UNDER UTILIZATION		TOTAL EMP	UNDER UTILIZATION				
			% AVAIL	#			% AVAIL	#			% AVAIL	#		% AVAIL	#		% AVAIL	#			
1) OFFICIALS & MANAGERS	1	1	38.6	0	0.0	0	5.7	0	5.7	0	6.3	0	6.3	0	3.6	0	3.6	0	0.4	0	0.4
2) PROFESSIONALS	0	0	49.5	0	0.0	0	7.9	0	0.0	0	0.7	0	0.0	0	4.2	0	0.0	0	0.4	0	0.0
3) TECHNICIANS	0	0	52.1	0	0.0	0	16.0	0	0.0	0	1.7	0	0.0	0	4.6	0	0.0	0	0.2	0	0.0
5) ADMINISTRATIVE SUPPORT	3	3	76.5	0	0.0	0	18.7	1	18.7	0	1.3	0	1.3	0	3.0	0	3.0	0	0.5	0	0.5
6) CRAFT WORKER	0	0	4.8	0	0.0	0	22.2	0	0.0	0	0.6	0	0.0	0	1.3	0	0.0	0	0.5	0	0.0
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.3	0	0.0
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.6	0	0.0
9) SERVICE WORKERS	0	0	57.7	0	0.0	0	31.1	0	0.0	0	1.2	0	0.0	0	4.0	0	0.0	0	0.5	0	0.0
TOTALS	4	4		0		0		1		0		0		0		0		0		0	

13.a21

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 INFORMATION TECHNOLOGY REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE					HISPANIC					BLACK					ASIAN/PACIFIC ISLANDER					AMERICAN INDIAN/ALASKAN NATIVE				
	TOTAL EMP	WORK FORCE	UNDER UTILIZATION			TOTAL EMP	WORK FORCE	UNDER UTILIZATION			TOTAL EMP	WORK FORCE	UNDER UTILIZATION			TOTAL EMP	WORK FORCE	UNDER UTILIZATION			TOTAL EMP	WORK FORCE	UNDER UTILIZATION		
			% AVAIL	#	%			% AVAIL	#	%			% AVAIL	#	%			% AVAIL	#	%			% AVAIL	#	%
1) OFFICIALS & MANAGERS	1	0	38.6	0	38.6	0	5.7	0	5.7	0	6.3	0	6.3	0	3.6	0	3.6	0	3.6	0	0.4	0	0.4		
2) PROFESSIONALS	3	1	49.5	0	0.0	0	7.9	0	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	4.2	0	0.4	0	0.4		
3) TECHNICIANS	0	0	52.1	0	0.0	0	16.0	0	0.0	0	1.7	0	0.0	0	4.6	0	0.0	0	0.0	0	0.2	0	0.0		
5) ADMINISTRATIVE SUPPORT	0	0	76.5	0	0.0	0	18.7	0	0.0	0	1.3	0	0.0	0	3.0	0	0.0	0	0.0	0	0.5	0	0.0		
6) CRAFT WORKER	0	0	4.8	0	0.0	0	22.2	0	0.0	0	0.6	0	0.0	0	1.3	0	0.0	0	0.0	0	0.5	0	0.0		
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.0	0	0.3	0	0.0		
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0	0	0.0		
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.6	0	0.0		
9) SERVICE WORKERS	0	0	57.7	0	0.0	0	31.1	0	0.0	0	1.2	0	0.0	0	4.0	0	0.0	0	0.0	0	0.5	0	0.0		
TOTALS	4	1		0		0		0		0		0		0		0		0		0		0			

13.a22

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 LEGAL REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ ALASKAN NATIVE				
	TOTAL EMP	WORK FORCE AVAIL	UNDER		WORK FORCE AVAIL	WORK FORCE AVAIL	UNDER														
			% UTILIZATION	#			% UTILIZATION	#			% UTILIZATION	#			% UTILIZATION	#			% UTILIZATION	#	% UTILIZATION
1) OFFICIALS & MANAGERS	0	0	38.6	0	0.0	0	5.7	0	0.0	0	6.3	0	0.0	0	3.6	0	0.0	0	0.4	0	0.0
2) PROFESSIONALS	1	1	49.5	0	0.0	0	7.9	0	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	0.4	0	0.4
3) TECHNICIANS	0	0	52.1	0	0.0	0	16.0	0	0.0	0	1.7	0	0.0	0	4.6	0	0.0	0	0.2	0	0.0
5) ADMINISTRATIVE SUPPORT	2	2	76.5	0	0.0	0	18.7	0	18.7	0	1.3	0	1.3	0	3.0	0	3.0	0	0.5	0	0.5
6) CRAFT WORKER	0	0	4.8	0	0.0	0	22.2	0	0.0	0	0.6	0	0.0	0	1.3	0	0.0	0	0.5	0	0.0
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.3	0	0.0
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.6	0	0.0
9) SERVICE WORKERS	1	1	57.7	0	0.0	1	31.1	0	0.0	0	1.2	0	1.2	0	4.0	0	4.0	0	0.5	0	0.5
TOTALS	4	4		0		1		0		0		0		0		0		0		0	

13.a23

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 FACILITIES MAINTENANCE REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER			AMERICAN INDIAN/ ALASKAN NATIVE					
	TOTAL EMP	WORK FORCE	UNDER		WORK FORCE	UNDER															
			% AVAIL	% UTILIZATION		% AVAIL	% UTILIZATION														
1) OFFICIALS & MANAGERS	0	0	38.6	0	0.0	0	5.7	0	0.0	0	6.3	0	0.0	0	3.6	0	0.0	0	0.4	0	0.0
2) PROFESSIONALS	0	0	49.5	0	0.0	0	7.9	0	0.0	0	0.7	0	0.0	0	4.2	0	0.0	0	0.4	0	0.0
3) TECHNICIANS	0	0	52.1	0	0.0	0	16.0	0	0.0	0	1.7	0	0.0	0	4.6	0	0.0	0	0.2	0	0.0
5) ADMINISTRATIVE SUPPORT	0	0	76.5	0	0.0	0	18.7	0	0.0	0	1.3	0	0.0	0	3.0	0	0.0	0	0.5	0	0.0
6) CRAFT WORKER	4	0	4.8	0	4.8	0	22.2	1	22.2	1	0.6	0	0.0	0	1.3	0	1.3	0	0.5	0	0.5
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.3	0	0.0
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.6	0	0.0
9) SERVICE WORKERS	9	1	57.7	4	46.6	3	31.1	0	0.0	2	1.2	0	0.0	1	4.0	0	0.0	0	0.5	0	0.5
TOTALS	13	1		4		3		1		3	0		1	0		0		0		0	

13.a24

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 PARACRUZ REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ ALASKAN NATIVE			
	TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER		TOTAL EMP	WORK FORCE	UNDER	
			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION			% AVAIL	% UTILIZATION
1) OFFICIALS & MANAGERS	3	1	38.6	0 0.0	0	0	5.7	0 5.7	0	0	6.3	0 6.3	0	0	3.6	0 3.6	0	0	0.4	0 0.4
2) PROFESSIONALS	2	0	49.5	1 49.5	0	0	7.9	0 7.9	0	0	0.7	0 0.7	0	0	4.2	0 4.2	0	0	0.4	0 0.4
3) TECHNICIANS	0	0	52.1	0 0.0	0	0	16.0	0 0.0	0	0	1.7	0 0.0	0	0	4.6	0 0.0	0	0	0.2	0 0.0
5) ADMINISTRATIVE SUPPORT	15	14	76.5	0 0.0	7	7	18.7	0 0.0	2	2	1.3	0 0.0	0	0	3.0	0 3.0	0	0	0.5	0 0.5
6) CRAFT WORKER	0	0	4.8	0 0.0	0	0	22.2	0 0.0	0	0	0.6	0 0.0	0	0	1.3	0 0.0	0	0	0.5	0 0.0
7) OPERATIVES (NON BUS-OP)	32	16	30.6	0 0.0	18	18	48.8	0 0.0	0	0	1.0	0 1.0	2	2	3.1	0 0.0	1	1	0.3	0 0.0
BUS OPERATORS	0	0	51.5	0 0.0	0	0	26.5	0 0.0	0	0	1.5	0 0.0	0	0	1.5	0 0.0	0	0	0.0	0 0.0
8) LABORERS AND HELPERS	0	0	24.0	0 0.0	0	0	67.8	0 0.0	0	0	0.5	0 0.0	0	0	1.5	0 0.0	0	0	0.6	0 0.0
9) SERVICE WORKERS	1	0	57.7	1 57.7	1	1	31.1	0 0.0	0	0	1.2	0 1.2	0	0	4.0	0 4.0	0	0	0.5	0 0.5
TOTALS	53	31		2	26		0	2		0	2		0	2		0	1		0	

13.025

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 OPERATIONS REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER			AMERICAN INDIAN/ ALASKAN NATIVE					
	TOTAL EMP	WORK FORCE	UNDER		WORK FORCE	% AVAIL	UNDER		WORK FORCE	% AVAIL	UNDER		WORK FORCE	% AVAIL	UNDER		WORK FORCE	% AVAIL	UNDER		
			%	UTILIZATION			#	%			#	%			UTILIZATION	#			%	UTILIZATION	#
1) OFFICIALS & MANAGERS	1	1	38.6	0	0.0	0	5.7	0	5.7	0	6.3	0	6.3	0	3.6	0	3.6	0	0.4	0	0.4
2) PROFESSIONALS	1	0	49.5	0	49.5	0	7.9	0	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	0.4	0	0.4
3) TECHNICIANS	1	1	52.1	0	0.0	0	16.0	0	16.0	0	1.7	0	1.7	0	4.6	0	4.6	0	0.2	0	0.2
5) ADMINISTRATIVE SUPPORT	4	4	76.5	0	0.0	1	18.7	0	0.0	0	1.3	0	1.3	0	3.0	0	3.0	0	0.5	0	0.5
6) CRAFT WORKER	0	0	4.8	0	0.0	0	22.2	0	0.0	0	0.6	0	0.0	0	1.3	0	0.0	0	0.5	0	0.0
7) OPERATIVES (NON BUS-OP)	11	3	30.6	0	0.0	3	48.8	2	21.5	2	1.0	0	0.0	0	3.1	0	3.1	0	0.3	0	0.3
BUS OPERATORS	156	37	51.5	43	27.8	53	26.5	0	0.0	14	1.5	0	0.0	3	1.5	0	0.0	4	0.0	0	0.0
8) LABORERS AND HELPERS	0	0	24.0	0	0.0	0	67.8	0	0.0	0	0.5	0	0.0	0	1.5	0	0.0	0	0.6	0	0.0
9) SERVICE WORKERS	0	0	57.7	0	0.0	0	31.1	0	0.0	0	1.2	0	0.0	0	4.0	0	0.0	0	0.5	0	0.0
TOTALS	174	46		43		57		2		16		0		3		0		4		0	

13.a.26

CHART 4

WORK FORCE UTILIZATION ANALYSIS
 SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 FLEET MAINTENANCE REPORT AS OF 12/31/05
 BASED ON CENSUS 2000 DATA

EEOC JOB CATEGORY	FEMALE				HISPANIC				BLACK				ASIAN/PACIFIC ISLANDER				AMERICAN INDIAN/ ALASKAN NATIVE				
	TOTAL EMP	WORK FORCE AVAIL	UNDER		TOTAL EMP	WORK FORCE AVAIL	UNDER		TOTAL EMP	WORK FORCE AVAIL	UNDER		TOTAL EMP	WORK FORCE AVAIL	UNDER		TOTAL EMP	WORK FORCE AVAIL	UNDER		
			%	UTILIZATION			#	%			%	UTILIZATION			#	%			%	UTILIZATION	#
1) OFFICIALS & MANAGERS	1	0	38.6	0	38.6	0	5.7	0	5.7	0	6.3	0	6.3	0	3.6	0	3.6	0	0.4	0	0.4
2) PROFESSIONALS	1	0	49.5	0	49.5	0	7.9	0	7.9	0	0.7	0	0.7	0	4.2	0	4.2	0	0.4	0	0.4
3) TECHNICIANS	0	0	52.1	0	0.0	0	16.0	0	0.0	0	1.7	0	0.0	0	4.6	0	0.0	0	0.2	0	0.0
5) ADMINISTRATIVE SUPPORT	7	3	76.5	2	33.6	0	18.7	1	18.7	0	1.3	0	1.3	1	3.0	0	0.0	1	0.5	0	0.0
6) CRAFT WORKER	24	0	4.8	1	4.8	8	22.2	0	0.0	0	0.6	0	0.6	2	1.3	0	0.0	0	0.5	0	0.5
7) OPERATIVES (NON BUS-OP)	0	0	30.6	0	0.0	0	48.8	0	0.0	0	1.0	0	0.0	0	3.1	0	0.0	0	0.3	0	0.0
BUS OPERATORS	0	0	51.5	0	0.0	0	26.5	0	0.0	0	1.5	0	0.0	0	1.5	0	0.0	0	0.0	0	0.0
8) LABORERS AND HELPERS	13	1	24.0	2	16.3	10	67.8	0	0.0	1	0.5	0	0.0	0	1.5	0	1.5	0	0.6	0	0.6
9) SERVICE WORKERS	0	0	57.7	0	0.0	0	31.1	0	0.0	0	1.2	0	0.0	0	4.0	0	0.0	0	0.5	0	0.0
TOTALS	46	4		5		18		1		1	0		3	0		1		0			

13.a27

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-01: OFFICIALS & MANAGERS

JOB CLASSIFICATION SALARY RANGE	TOTAL		WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$5,375-\$6,841 ASST FINANCE MANAGER	1	1														1
\$7,859-***** ASST GENERAL MANAGER	1	1														1
\$5,375-\$6,841 BASE SUPT	1	1														1
\$6,434-\$8,188 FINANCE MANAGER	1	1														1
\$9,998-***** GENERAL MANAGER	1	1														1
\$6,434-\$8,188 HUMAN RES MANAGER	1	1														1
\$6,434-\$8,188 INFO TECH MANAGER	1	1														1
\$7,145-\$9,105 MAINTENANCE MANAGER	1	1														1
\$5,375-\$6,841 PARATRAN ADMINSTR	1	1														1
\$3,716-\$4,749 PARATRAN ELIG COORD	1	1														1
\$3,721-\$4,753 PARATRAN SUPERINTEN	1	1														1
\$5,375-\$6,841 PROJ MGR, METROBASE	1	1					1							1		1
TOTAL	12	6	5	1	1	1	1	1	1	1	1	1	1	1	7	5

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-02: PROFESSIONALS

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$3,068-\$3,917 ACCESS SERVICES COOR	1	1												1	
\$4,274-\$5,462 BUYER	1	1												1	
\$9,077-***** DISTRICT COUNSEL	1		1												1
\$4,425-\$5,649 GRANTS/LEGIS ANALYST	1	1												1	
\$4,103-\$5,236 SAFETY&TRAINING COOR	1	1												1	
\$3,573-\$4,687 SR IT TECH	1		1												1
\$5,753-\$7,342 SR. DATAB ADMINISTR	1	1												1	
\$4,581-\$5,845 SYS ADMINISTRATOR	1	1												1	
\$1,945-\$3,108 TRNG & RD RESP COORD	2	2												2	
TOTAL	10	8	2											8	2

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-03: TECHNICIANS

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$4,103-\$5,236 SCHEDULE ANALYST	1		1												1
\$2,349-\$3,002 TRANSIT SURVEYOR	1		1												1
TOTAL	2		2												2

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-05: ADMINISTRATIVE SUPPORT

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$3,191-\$4,079 ACCOUNTING SPECIALST	1		1												1
\$2,782-\$3,550 ACCTNG TECH	2		2												2
\$2,782-\$3,550 ADMIN ASSISTANT	1		1												1
\$2,465-\$3,146 ADMIN CLERK I	1				1							1			1
\$2,782-\$3,550 ADMIN SECRETARY	1		1												1
\$2,921-\$3,725 ADMIN SECRETARY/SUP	2		2												2
\$3,716-\$4,749 ADMIN SERV COOR	1		1												1
\$3,222-\$4,115 BENEFITS COORDINATOR	1		1												1
\$3,108-\$3,961 CUS SERV COORD	1		1												1
\$2,560-\$3,262 CUS SERV REP	3				3							3			3
\$1,945-\$2,997 DISPATCH/SCHEDULERS	14		8	2	2				2			2	4	2	12
\$3,222-\$4,115 HR SPECIALIST	1		1												1
\$3,460-\$4,385 LEAD PARTS CLERK-FM	1	1													1

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-06: SKILLED CRAFT

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F		
\$3,926-\$5,009 FAC MAINT SUPERVISOR	1	1													1
\$3,060-\$3,905 FAC MAINT WKR II	2	1						1				1			2
\$4,297-\$5,477 FLT MAINT SUPERVISOR	1	1													1
\$3,836-\$4,862 FM LEAD MECHANIC	6	4		1		1						2			6
\$3,330-\$4,215 FM MECHANIC I	3	1		1		1						2			3
\$3,491-\$4,418 FM MECHANIC II	10	7		3								3			10
\$3,659-\$4,630 FM MECHANIC III	4	2		2								2			4
\$3,345-\$4,252 SR FAC MAINT WKR	1	1													1
\$3,143-\$3,983 UPHOLSTERER II	1			1								1			1
TOTAL	29	18		8		2		1				11			29

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-07: OPERATIVES

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$2,252-\$4,299 BUS OPERATOR	172	65	27	52	6	3		9	6	3	1	67	13	132	40
\$3,761-\$4,794 TRANSIT SUPERVISOR	11	3	3	3				2				5		8	3
\$1,945-\$2,785 VAN DRIVERS	69	11	13	22	17	2	2				2	24	21	35	34
TOTAL	252	79	43	77	23	5	2	11	6	3	3	96	34	175	77

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-08: LABORERS AND HELPERS

JOB CLASSIFICATION SALARY RANGE	TOTAL		WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$2,714-\$3,448 VEH SERV DETAILER	2				2								2		2	
\$2,987-\$3,793 VEH SERV TECHNICIAN	2		1		1								1		2	
\$2,347-\$2,983 VEH SERV WKR I	1	1			1								1		1	
\$2,584-\$3,286 VEH SERV WKR II	9		1		6	1			1				7	1	8	1
TOTAL	14		2		10	1			1				11	1	13	1

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
 QUARTERLY WORK FORCE COMPOSITION
 SYSTEMWIDE DISTRIBUTION BY EEOC JOB CATEGORY AND JOB TITLE
 AS OF: 12/31/2005

CHART 5

EEO-09: SERVICE MAINTENANCE

JOB CLASSIFICATION SALARY RANGE	TOTAL	WHITE		HISPANIC		ASIAN		BLACK		AM. INDIAN		TOTAL MIN.		TOTAL ALL	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
\$3,345-\$4,274 CLAIMS INVESTIGTR I	1			1								1		1	
\$2,343-\$2,978 CUSTOD SERV WKR I	5	1		2		1		1				3	1	4	1
\$2,626-\$3,337 FAC MAINT WKR I	3	2		1								1		3	
\$1,945-\$2,997 GAS MECHANIC II	2			2								2		2	
\$2,883-\$3,688 LEAD CUSTODIAN	1							1				1		1	
TOTAL	12	3		5	1	1		2				7	2	10	2

13.a36

VIII. EMPLOYMENT GOALS

Assessment of 2003 - 2005 Appointment Goals

The Equal Employment Opportunity Policy of the Santa Cruz Metropolitan Transit District states that the District seeks to achieve a workforce in which minorities and females are represented in numbers consistent with the area workforce. Future District employment goals are based upon the percentage of minorities and females in the Santa Cruz County workforce as reported by the 2000 census.

Goals were established for 2003 - 2005 based upon workforce composition data and the areas of underutilization within the District. Chart 7 identifies the appointment goals and the 118 appointments made between January 1, 2003 and December 31, 2005. Included in this chart are promotions, promotion by qualification, new hires, reinstatements from layoff and furlough, and provisional appointments.

The District appointed 40 females, exceeding its goal of 14 females District-wide during the Affirmative Action period. The District appointed 54 minorities, exceeding its goal of 3 minorities District-wide. Appointments made during the EEO Plan period were 53.4% female and 57.5% minority.

CHART 7

**APPOINTMENT GOALS
JANUARY 1, 2003 – DECEMBER 31, 2005**

EEOC JOB CATEGORY	APPOINTMENT GOALS	POSITIONS FILLED	APPOINTMENTS	
OFFICIALS & MANAGERS	1 Hispanic	Project Manager	1	M/API
	1 Female	Human Resources Manager	1	F/WHT
		Maintenance Manager	1	M/WHT
PROFESSIONALS	None	Sr. IT Technician	1	F/WHT
		Training & Response Coord.	1	M/WHT
		Safety & Training Coordinator	1	M/WHT
		Systems Administrator	1	M/WHT
TECHNICIANS	None	Schedule Analyst	1	F/WHT
		Supervisor of Revenue Collec.	1	F/WHT
ADMINISTRATIVE SUPPORT WORKERS	None	Accounting Technician	2	F/WHT
		Senior Accounting Technician	2	F/WHT, F/AIA
		Accounting Specialist	1	F/WHT
		Paratransit Clerk	1	F/BLK
		Administrative Assistant	1	F/WHT
		Administrative Clerk	1	F/HIS
		Administrative Services Coord.	1	F/WHT
		Dispatch/Schedulers	7	4F/WHT, 1F/HIS 1M/HIS, 1F/BLK
		Reservationist	5	F/HIS
		Parts Clerk	1	M/WHT
		Benefits Coordinator	2	F/WHT
		Human Resources Specialist	1	F/WHT
		Personnel Technician	1	F/WHT
Claims Investigator	1	F/HIS		
CRAFT WORKERS	4 Females	Mechanic I	4	M/API, 2M/HIS, M/WHT
		Mechanic II	3	2M/WHT, M/HIS
		Lead Mechanic	1	M/HIS
		Upholsterer II	1	M/HIS
		Facilities Main. Supervisor	1	M/WHT
		Lead Mechanic	4	2M/WHT, M/HIS, M/API
OPERATIVES	1 American/Alaskan	Van Driver	1	F/AIA
			2	F/API, M/API
			18	8F/HIS, 10M/HIS
			11	6F/WHT, 5M/WHT
		Bus Operator	12	3F/WHT, 9M/WHT
			2	M/BLK
			1	M/AIA
	10	M/HIS		
	7	M/BLK, 2F/WHT, 3M/WHT		
LABORERS AND HELPERS	None	Vehicle Service Worker I	1	M/HIS
		Vehicle Service Worker II	3	M/HIS
TOTAL APPOINTMENTS			118	

13.938

APPOINTMENT GOALS

Database for Selection of Population Statistics

The U.S. Census Bureau provides the statistical database for the civilian labor force used to determine the percentages of females and minorities in the area workforce. Civilian workforce statistics are used rather than general population statistics since the general population is not reflective of the population available for work. The general population includes children under the age of 16, students, retired workers, inmates of institutions, etc. Workforce statistics are the standards, which are used by compliance agencies (EEOC and DFEH) and the judicial system to determine evidence of discrimination.

Appointment Goals

The District bases its appointment goals for the agency as a whole and each job category on the utilization chart (Chart #4). The utilization charts identify the EEOC job categories, which are below parity in each protected class. Chart 8, on the following page, lists 2003 -2005 appointment goals by EEOC job category for the District. In addition to the appointment goals, the District will continue its commitment to reach parity with the female and minority population segments of the Santa Cruz County labor force. The District will also continue to identify and eliminate employment barriers not only for female and minority protected classes, but also for the disabled and forty years and older protected classes.

CHART 8

APPOINTMENT GOALS
BY EEOC JOB CATEGORY

JANUARY 1, 2006 – DECEMBER 31, 2008

EEOC Job Category	Minority	Female
Officials & Managers	Hispanic (1), Black (1)	No underutilization
Professionals	Hispanic (1)	2
Technicians	No underutilization	No underutilization
Administrative Support	No underutilization	No underutilization
Craft Workers	No underutilization	2
Operatives (not bus operators)	No underutilization	No underutilization
Operative (bus Operators)	No underutilization	43
Laborers & helpers	No underutilization	2
Service Workers	No underutilization	4
Total	Hispanic (2), Black (1)	53*

* Due to the large disparity of female Operatives in the Bus Operator category it is unlikely this goal will be met during the length of this report. However, the District will strive to significantly increase the number of female Bus Operators.

IX. EQUAL EMPLOYMENT OPPORTUNITY ACTIVITIES

FREQUENCY

- | | | |
|-----|---|------------------------|
| 1. | Include an EEO policy statement in District publications. | Ongoing |
| 2. | Inform management and supervisory staff about EEO status and concerns. | Ongoing |
| 3. | Produce EEO report including current workforce utilization. | Quarterly |
| 4. | Produce EEO reports on appointments, goals, new hires, separations, transfers, promotions and training. | Annually |
| 5. | Maintain records on applicant flow data by ethnicity, gender, disability, age, recruitment and referral source. | Each Recruitment |
| 6. | Recruit candidates with Spanish speaking skills | Applicable Recruitment |
| 7. | Include the EEO policy as part of the orientation process for new employees. | Each Appointment |
| 8. | Inform employees of the EEO Plan. | Ongoing |
| 9. | Include in District contracts with vendors a statement of nondiscrimination. | Ongoing |
| 10. | Communicate current EEO legal information to appropriate District personnel. | Ongoing |
| 11. | Update EEO Plan. | Triennially |
| 12. | Provide information to EEO committee on achievement of appointment goals. | Ongoing |
| 13. | Contact local community organizations representing minority, disabled, and female organizations, community groups, educational institutions, and student unions and associations to elicit their assistance in the referral of qualified applicants from protected classes. | Ongoing |
| 14. | Training opportunities for current employees to assist employees in developing skills needed for future promotions. | Explore Options |

DISCRIMINATION COMPLAINT PROCEDURE

All District employees have the right to file complaints of alleged discrimination. The procedure for filing discrimination complaints is as follows:

An employee who feels that he or she has been discriminated against due to race, color, ancestry, national origin, religious creed, sex, medical condition or disability, age, marital status, and sexual orientation may file a complaint alleging discrimination. A complaint must be in writing, signed and filed as soon as possible after the alleged discrimination occurred but no later than one hundred calendar days. The complaint should be directed to the General Manager or the Equal Employment Opportunity Officer.

The General Manager and/or the Equal Employment Opportunity Officer will initiate an investigation within fifteen calendar days of receipt of the written complaint. Whenever possible, the District will attempt to resolve complaints on an informal basis. The formal investigation shall be completed within forty-five days. Within ten days of completion of the investigation, a decision will be rendered in writing and sent to the employee who filed the complaint. Upon request, the employee may discuss the decision with the General Manager and/or the Equal Employment Opportunity Officer.

If an employee is not satisfied with the resolution of his or her complaint, she or he may file a written complaint with:

- The Federal Transit Administration, 211 Main Street, Room 1160, San Francisco, CA 94105
- The Secretary of the U.S. Department of Transportation, 400 7th Street, S.W., Washington, D.C. 20590
- The U.S. Equal Employment Opportunity Commission, 901 Market Street, Suite 500, San Francisco, CA 94103 (complaint generally required to be filed within 180 days of the incident)
- The California Fair Employment and Housing Commission, 111 North Market Street, Suite 810, San Jose, CA 95113-1102 (complaint generally required to be filed within 300 days of the incident)

13.942

APPENDIX B

REASONABLE ACCOMMODATION PROCEDURE

The District utilizes this six-step procedure for determining reasonable accommodation for current employees who become disabled during District employment and for job applicants with disabilities.

The first step entails the employee's or applicant's identification of his/her disability, as covered under the Americans with Disabilities Act, and request for reasonable accommodation.

The second step conducts a job analysis of the specific position to be filled. This provides a clear understanding of job requirements and the work environment.

The third step identifies functional characteristics of the applicant or employee. This is to learn the type and nature of disability and to fully understand the specific abilities and limitations of the individual.

The fourth step carefully compares the job analysis data with the characteristics of the disability of the employee or applicant. This information is used to identify and understand incompatibilities which exist between the known limitations of the applicant or employee and the job requirements and/or work environment which impede, or are likely to impede, satisfactory performance.

The fifth step develops a list of potential remedies to determine the most reasonable methods to resolve identified problems. Examples of remedies may include adaptive equipment, architectural modifications, communication aids, scheduling adjustments, and body mechanics. The proper remedy choice must be made on an individual basis. When considering possible alternatives, the District makes an effort to involve experts in the field and those individuals who will be affected, especially the disabled individual. Accommodations prescribed without involvement of the disabled individual are rarely as effective or appropriate as those which are planned with such input.

The sixth and final step evaluates the success of the accommodation made after a period of employment.

13.a43

APPENDIX C

POLICY REGARDING PERSONS WITH DISABILITIES

The District's Equal Employment Opportunity states that persons who are disabled shall not be discriminated against.

As part of the Equal Employment Opportunity Action Plan, the District shall actively recruit persons with a disability by notifying agencies and organizations, which serve the disabled community. The District shall maintain records on the number of persons with a disability that are employed.

The District shall consider a person with a disability qualified for a particular job when that person is capable of performing the essential duties of the job with or without reasonable accommodation for the person's disability. A claim that management has failed to provide a reasonable accommodation is a matter, which may be handled in accordance with the discrimination complaint procedure.

LIFE THREATENING ILLNESS POLICY

POLICY STATEMENT

Santa Cruz Metropolitan Transit District (District) recognizes that an employee with a life-threatening illness including, but not limited to, cancer, heart disease, degenerative neurological disease, and acquired immune deficiency syndrome (AIDS), may wish to continue to engage in as many normal pursuits as the condition allows, including work. As long as an employee is able to meet acceptable performance standards and medical evidence indicates that the condition is not a threat to the employee or others, managers and supervisors should be sensitive to his/her condition, and ensure that the employee is treated consistently with other employees. At the same time, the District has an obligation to provide a safe work environment for all employees and customers. Every precaution should be taken to ensure that an employee's condition does not present a health and/or safety threat to other employees or customers.

Any employee with a life-threatening illness is covered by District benefits and policies relating to insurance, health and disability benefits, non-discrimination, and equal employment opportunity.

GUIDELINES

When dealing with situations involving employees with life-threatening illnesses, managers and supervisors should:

1. Remember that an employee's health condition is personal and confidential, and precautions (legally required) should be taken to protect information regarding any employee's health condition.
2. Be sensitive and responsive to co-workers' concerns and emphasize employee education available through the Human Resources Department.
3. Be sensitive to the fact that continued employment for an employee with a life-threatening illness may sometimes be therapeutically important in the remission or recovery process, or may help to prolong the employee's life.
4. If warranted, make reasonable accommodation for an employee with the life-threatening illness consistent with the business needs of the District.
5. Advise an employee who has reported a life-threatening illness that consultation on disability plans and other benefits to assist them in effectively managing their situation is available through the Human Resources Department.
6. Give no special consideration beyond normal transfer policies for employees who feel threatened by a co-worker's life-threatening illness.

7. Contact the Human Resources Department if you believe that you or your employees need information about terminal or contagious illnesses, or a specific life-threatening illness, or if you need further guidance in managing a situation that involves an employee with a life-threatening illness.

AVAILABLE RESOURCES

Consistent with our concern for employees with life-threatening illnesses, the District offers the following range of resources available through the employee's department and the Human Resources Department:

1. Management and employee education and information on terminal illness and specific life-threatening illnesses.
2. Referral to agencies and/or organizations which offer supportive services for life-threatening illnesses.
3. Benefit consultation to assist employees in effectively managing health, leave of absence, and other benefits.

APPENDIX E

**SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
SEXUAL HARASSMENT POLICY**

PURPOSE

The purpose of this policy is to establish a strong commitment to prohibit sexual harassment in employment and to define discrimination harassment.

POLICY STATEMENT

Sexual Harassment is prohibited. It is the policy of the Santa Cruz Metropolitan Transit District to ensure an employment environment free from sexual harassment and to take reasonable steps to prevent harassment from occurring in the employment environment. These steps are as follows:

- a. Affirmatively raising the subject of harassment with employees.
- b. Expressing strong disapproval.
- c. Developing appropriate discipline up to and including termination.
- d. Informing employees of their right to raise and how to raise the issues of sexual harassment.
- e. Developing methods to educate employees.

It is the policy of the District to not tolerate, condone or trivialize sexual harassment by any District employee. Any harasser, if a District employee, shall be subject to appropriate discipline as determined by the District General Manager, Equal Employment Officer, or department manager. Discipline, up to and including termination, may be imposed. Furthermore, the harassing employee, as well as a supervisor who knew about the harassment and condoned or ratified it, may be held personally liable for damages awarded by a court of law or compliance agency.

It is also the policy of the District to not tolerate, condone or trivialize sexual harassment by contractors of the District or other individuals in the work place. The District shall investigate complaints of sexual harassment filed by District employees against contractors or others and seek remedy for such complaints within the extent of the District's control of the conduct of such individuals. Such remedies could include termination of or refusal to renew contracts.

The Equal Employment Opportunity Officer is responsible for:

- a. Ensuring that this policy, its definition of harassment and the complaint procedures are disseminated to all employees.

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- b. Providing guidance, training and assistance to department managers, supervisors, and employees on dealing with harassment within their areas of responsibility.
- c. Investigating, resolving and making findings and recommendations on complaints of harassment that are filed with the Equal Employment Officer.

Department managers and supervisors are responsible for:

- a. Informing departmental personnel of their rights and responsibilities under this policy.
- b. Investigating and resolving complaints involving departmental personnel.
- c. Investigating and resolving complaints involving contractors or others.

DEFINITION

Sexual harassment is a form of unlawful sex discrimination under both Federal and State law. Sexual harassment in employment violates the provisions of the California Fair Employment and Housing Act. This Act requires employers to institute a program to eliminate sexual harassment from the workplace.

Sexual harassment is defined as unwanted sexual advances, or visual, verbal or physical conduct of a sexual nature. This definition includes many forms of offensive behavior and includes gender-based harassment of a person of the same sex as the harasser.

Three common types of sexual harassment are:

- a. "Quid pro quo" harassment occurs when a supervisor conditions the granting of promotional economic benefit upon the receipt of sexual favors from a subordinate or punishes the subordinate for refusing to submit to his/her request.
- b. A second kind of sexual harassment is a "hostile work environment." A hostile work environment exists where supervisors and/or co-workers create an atmosphere so infused with unwelcome sexually oriented conduct that an individual's reasonable comfort or ability to perform is affected. In a hostile work environment the employee may be either:
 - (1) personally subjected to offensive remarks and inappropriate visual displays or touching, or
 - (2) he/she may personally witness the harassing conduct toward other employees even if he/she is not personally subjected to the harassment.

13. a48

The standard used by civil rights agencies and courts in determining whether a hostile work environment exists is whether a reasonable person, or reasonable woman, in same or similar circumstances, would find the conduct offensive.

- c. A third kind of sexual harassment is retaliation against an employee for submitting complaints of alleged sexual harassment. Retaliatory conduct often occurs in the workplace when the victim reports sexual harassment and then is disciplined, transferred, shunned, or denied a promotional opportunity.

Sexual harassment includes but is not limited to:

- a. Verbal sexual advances or propositions; making or threatening reprisals after a negative response to sexual advances; verbal conduct such as making or using derogatory comments, epithets, slurs, and jokes; verbal abuse of a sexual nature, graphic verbal commentaries about an individual's body, sexually degrading words used to describe an individual, suggestive or obscene letters, notes, or invitations.
- b. Physical conduct, e.g., touching, assaults, impeding or blocking movement or any physical interference with normal work or movement when directed at an employee on the basis of the employee's sex.
- c. Visual conduct, e.g., leering, gestures, displaying sexually suggestive objects or pictures, derogatory posters, cartoons, or drawings on the basis of the employee's sex.
- d. Unwanted sexual advances.
- e. Offering employment benefits in exchange for sexual favors.

PROCEDURE

The procedure for resolving complaints of alleged sexual harassment is set forth in this Equal Employment Opportunity Action Plan.

APPENDIX F

RACE/ETHNIC IDENTIFICATION

The information included below conforms to the 1990 census descriptions of race. The District will be converting to new categories in 2007 as required by the U.S. Department of Labor.

The concept of race as used by the Equal Employment Opportunity Commission does not denote scientific definitions of anthropological origins. For the purposes of EEO data collection, and identifies with, or is regarded in the community as belonging. However, no persons should be counted in more than one race/ethnic category.

AMERICAN INDIAN/ALASKAN NATIVE: All persons having origins in any of the original peoples of North America and who maintain cultural identification through tribal affiliation or community recognition.

ASIAN OR PACIFIC ISLANDERS: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands. This area includes, for example, China, Japan, Korea, the Philippine Islands and Samoa.

BLACK (not of Hispanic origin): All persons having origins in any of the Black racial groups of Africa.

HISPANIC: All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

WHITE (not of Hispanic origin): All persons having origins in any of the original peoples of Europe, North Africa or the Middle East.

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APPENDIX G

DESCRIPTION OF EEOC JOB CATEGORIES

Officials and Managers: Occupations requiring administrative and managerial personnel, who set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of a firm's operation.

Include only those company officers and managers who are exempt from the minimum wage and overtime provisions of the Fair Labor Standards Act.

Professionals: Occupations requiring either college graduation or experience of such kind and amount as to provide a comparable background.

Technicians: Occupations requiring a combination of basic scientific knowledge and manual skill which can be obtained through 2 years of post high school education, such as is offered in many technical institutes and junior colleges, or through on the job training.

Sales: Occupations engaged wholly or primarily in direct selling.

Official and Clerical: Administrative support occupations, including all clerical-type work regardless of level of difficulty, where the activities are predominately non-manual through some manual work not directly involved with altering or transporting the products is included.

Craft Workers (Skilled): Manual workers of relatively high level (precision production and repair) having a thorough and comprehensive knowledge of the process involved in their work. Exercise considerable independent judgment and usually received and extensive period of training.

Exclude learners and helpers of craft workers.

Operative (Semiskilled): Workers who operate transportation or materials moving equipment, or who operate machine or processing equipment, or who perform other factory-type duties of intermediate skill level which can be mastered in a few weeks and require only limited training.

Includes apprentices in such fields as auto mechanics, plumbing, bricklaying, carpentry, building trades, metalworking trades, and printing trades.

Laborers (Unskilled): Handlers, equipment cleaners, helpers and other workers in manual occupations which generally require no special training and who perform elementary duties that may be learned in a few days and require the application of little or no independent judgment. Farm workers (laborers) are placed here, as well as farming, forestry and fishing occupations not elsewhere covered.

Service Workers: Workers in both protective and non-protective service occupations.

Includes non-protective workers in professional and personal service, amusement and recreation, food service, maintenance, and unarmed sentinel occupations. Also includes protective workers in police and detection, fire fighting and fire protection, armed guard and security occupations.

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APPENDIX H

DEFINITIONS

EQUAL EMPLOYMENT OPPORTUNITY OFFICER: The Human Resources Manager whose responsibilities are to develop, implement, and evaluate the District's affirmative action program.

EQUAL EMPLOYMENT OPPORTUNITY PLAN: A written plan outlining the course of action to be taken to eliminate and remedy past discrimination or underutilization of minorities and women.

AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967 (ADEA): ADEA promotes the employment of the older worker based on ability rather than age, and prohibits arbitrary age discrimination in employment.

AMERICANS WITH DISABILITIES ACT (ADA): ADA, passed July 26, 1990, provides comprehensive civil rights protection to individuals with disabilities that are similar in scope to those provided by Title VII of the Civil Rights Act. The purpose of the ADA is to ensure equal opportunity for the disabled in employment, public accommodations, public services and telecommunications. ADA also requires employers to make reasonable accommodations to known disabilities.

APPLICANT DATA: Statistical data which reflects the numerical results of employment actions such as application testing and hiring. This data is used to monitor employment actions to determine if they are in accordance with the intent and purpose of affirmative action.

APPOINTING AUTHORITY: This term applies to the General Manager of the District and departmental managers responsible for a particular hiring decision.

BONA FIDE OCCUPATION QUALIFICATION (BFOQ): A defense provided for in Title VII which an employer can raise to justify an employment practice which would otherwise be unlawful because of its discriminatory impact.

CIVIL RIGHTS ACT OF 1964, AS AMENDED: Title VII part of the Act states that: "It shall be unlawful employment practice for an employer:

1. to fail or refuse to hire or to discharge any individual, or otherwise to discriminate against any individual with respect to her/his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, sex, or national origin; or
2. to limit, segregate, or classify employees or applicants for employment in any way which would deprive any individual of employment opportunities or otherwise adversely affect her/his status as an employee, because of such individual's race, color, religion, sex, or national origin."

CIVIL RIGHTS ACT OF 1991: This Act made several significant changes in federal civil rights law. For example, the Act: requires the employer to demonstrate that facially neutral employment practices having a disparate impact against minorities are job related for the position in question and consistent with business necessity; specifies that all forms of racial bias in employment are covered;

13.952

prohibits challenges to consent decrees by individuals who had reasonable opportunity to object to the decree or whose interests were adequately represented by another party; stipulates that any intentional discrimination is unlawful, even if the same action would have resulted without the discriminatory motive; and extends the coverage to U.S. citizens employed by American companies abroad.

COMPLAINANT: A person who brings a complaint or charge alleging unlawful employment discrimination.

DISCRIMINATION: Employers may not refuse to hire, discharge, or otherwise show partiality or prejudice in compensation or in any other term, condition, or privilege of employment, against an individual based on an individual's protected class status.

DISPARATE TREATMENT: A term used to describe a situation where a person of one race, sex, or ethnic group receives different treatment from that afforded other persons of another race, sex, or ethnic group in similar situations or circumstances.

EQUAL EMPLOYMENT OPPORTUNITY COMMISSION (EEOC): EEOC is an independent agency empowered to prohibit all kinds of employment discrimination based on the categories protected by the Civil Rights Act. Also, the federal government requires EEO forms in which the employer must provide statistics on the number of employees by sex, race and protected ethnic classification in specific job categories.

EQUAL EMPLOYMENT OPPORTUNITY COMMISSION (EEOC) CATEGORIES: Job categories defined by the EEOC for reporting purposes (see Appendix E).

EQUAL EMPLOYMENT OPPORTUNITY: A term which describes a work environment that is free of unlawful employment discrimination; all persons are treated fairly and equally in accordance with applicable Federal and State law.

INDIVIDUAL WITH A DISABILITY (Section 504 of the Rehabilitation Act of 1973 and Americans with Disabilities Act of 1990). A person who has:

- a. a physical or mental impairment which substantially limits one or more major life activities;
- b. a record of such an impairment; or
- c. is regarded as having such an impairment.

PARITY: Parity exists when the percentage of females and minorities in the various job categories of the employer's workforce are in the same proportion that is found in the available workforce as provided by the current census data. Availability in the Santa Cruz County workforce means the percent or number of individuals within a protected class, as defined by the EEOC, available to work in a particular EEOC job category.

13. a53

PROTECTED CLASS: Legally identified group that is specifically protected by statute against employment discrimination. Unlike "affected class" which must be demonstrated, protected class status is automatically conferred upon recognized group members by virtue of the law or other court decisions interpreting the law.

REASONABLE ACCOMMODATION: The changing of work environments, schedules, or requirements to adapt to the known physical or mental limitations of a qualified handicapped/disabled applicant or employee.

RELEVANT WORKFORCE: The percentage of minorities and females in Santa Cruz County, as determined by the U.S. census data, available to work in a particular EEOC job category. This includes individuals who: (a) are at least 16 years old, (b) worked at any time during the reference week for the census data, (c) didn't work during the reference week but had jobs or businesses from which they were temporarily absent, (d) were on lay off, and (d) didn't work during the reference week but were looking for work during the last four weeks and were available for work during the reference week.

REMEDIAL ACTION: Any action that is taken by an employer to remedy the effects of past employment practices which may have excluded the appointment and promotion of ethnic minorities and women at various levels of the workforce.

SELECTION PROCESS: The process used to recruit, test, and appoint applicants for employment or to promote employees.

UNDERUTILIZATION: A term used to describe the numerical differences between the employer's workforce and the relevant workforce. If the employer's number is smaller than the relevant workforce, this indicates that the employer's workforce is below parity.

UNLAWFUL EMPLOYMENT DISCRIMINATION: Discrimination which is constitutionally or statutorily forbidden. Unlawful employment discrimination exists when there is causal connection between the issue (i.e., hiring, promotion, termination, etc.) and the basis (i.e., charging party's race, color, religion, sex, national origin, disability, etc.) of the complaint.

UTILIZATION ANALYSIS: The process of comparing the composition of the employer's workforce to the composition of the selected relevant workforce by sex and ethnic/racial categories. The numerical difference between the actual workforce and the relevant workforce indicates whether a particular group of employees, identified by sex and ethnic minority groups is underutilized in the employer's workforce. The difference between the employer's workforce and the relevant workforce is the factor used in setting appointment goals.

VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1974: 38 U.S.C. 4212 of the Vietnam Era Veterans Readjustment Assistance Act of 1974 prohibits job discrimination and requires affirmative action to employ and advance in employment qualified special disabled veterans and veterans of the Vietnam era.

WORKFORCE ANALYSIS: A statistical analysis of the numbers and percentages of employees by race, sex, and ethnic/racial grouping for each job class category.

13.254

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

DATE: October 27, 2006
TO: Board of Directors
FROM: Mark Dorfman, Assistant General Manager
SUBJECT: CONSIDERATION OF RESOLUTIONS AUTHORIZING AMENDED STA AND TDA CLAIMS FOR FY2007.

I. RECOMMENDED ACTION

It is recommended that the Board adopt two resolutions authorizing staff to submit an amended claim to the Santa Cruz County Regional Transportation Commission for FY2007 State Transit Assistance (STA) funds and Transportation Development Act (TDA) funds.

II. SUMMARY OF ISSUES

- In June, 2006, METRO staff submitted a claim to the Santa Cruz County Regional Transportation Commission (SCCRTC) for \$1,806,592 in STA funds and \$5,880,834 in TDA funds based upon SCCRTC's estimate of TDA and STA revenue to be received during the coming year.
- On June 30, 2006, the Governor signed the California FY2007 budget which significantly increased STA funds to \$4,720,782 through repayment of prior years' borrowing.
- On November 2nd, the SCCRTC will consider a supplemental appropriation of \$285,000 in TDA funds to METRO.
- Adopting the attached Resolutions will authorize METRO staff to submit an amended claim to the SCCRTC for the increased amounts of STA and TDA funds.
- As part of this process, the SCCRTC has requested additional narration and statistics on METRO's goals and performance for the current and the previous two years.

III. DISCUSSION

State Transit Assistance funds are derived from a portion of the ¼ cent sales tax on motor fuel by formula as defined by the Transportation Development Act. TDA funds are funded from ¼ cent of the 7.25 percent state sales tax collected countywide and returned to Santa Cruz. Each spring, the State Controller appraises the Santa Cruz County Regional Transportation Commission (SCCRTC) of the STA revenue projected to be allocated to the County during the coming year. The County Auditor forecasts the amount of TDA revenue anticipated to be earned in the county.

14.1

In early June, 2006, the District submitted a claim to the SCCRTC for \$1,806,592 in STA funds and \$5,880,834 in TDA funds based upon these estimates.

On June 30, 2006, the Governor signed the FY2007 budget for California. Unanticipated growth in sales tax revenue in June enabled early repayment of funds that the State borrowed in FY 2004 and FY2005 through the suspension of Proposition 42 allocations to transportation accounts. In addition, the FY 2007 budget fully funds Proposition 42 accounts in the current year. As a result, the Public Transit Account received nearly 3 years' worth of funding in FY 2007, and the amount of STA funds available to METRO this year increased from \$1,806,592 to \$4,720,782 .

On November 2nd, the SCCRTC will consider a supplemental allocation of \$285,000 in TDA funds to METRO based upon surplus TDA revenue collected by the County in FY 2006. The supplemental TDA allocation will increase the total TDA allocation for FY2007 from \$5,880,834 to \$6,165,834 .

Adopting the attached resolutions (Attachments A and B) will authorize staff to submit an amended claim (Attachment C) to the SCCRTC for the amount of STA and TDA funds now available for FY2007.

Along with this amended claim, the SCCRTC has requested that METRO provide information on its goals and performance during the latest full year of operations (FY 2006) in comparison to the previous two years. Attachment D contains the supplemental information requested in addition to the annual report that was submitted with the original claim.

IV. FINANCIAL CONSIDERATIONS

The amended STA claim will increase the amount of STA revenue in the District's FY2007 Capital Program by \$2,914,190 . TDA funds available for operating expenses will increase by \$285,000

V. ATTACHMENTS

- Attachment A:** Resolution Authorizing Submittal of Amended FY2007 STA Claim
- Attachment B:** Resolution Authorizing Submittal of Amended FY2007 TDA Claim
- Attachment C:** Amended FY2007 TDA/STA Claim
- Attachment D:** Supplemental Performance Information

14.2

**BEFORE THE BOARD OF DIRECTORS OF THE
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT**

Resolution No. _____

On the Motion of Director: _____

Duly Seconded by Director: _____

The Following Resolution is Adopted:

**RESOLUTION OF THE BOARD OF DIRECTORS OF THE
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
AUTHORIZING AN AMENDED CLAIM TO THE
SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION
FOR STATE TRANSIT ASSISTANCE FUNDS**

WHEREAS, the State Controller is authorized under Section 99313 of the Public Utilities Code to allocate State Transit Assistance (STA) funds to regional transportation planning agencies and county transportation commissions; and

WHEREAS, in accordance with the Sections 99313 and 99314 et al of the Public Utilities Code, the Santa Cruz Metropolitan Transit District is authorized to submit a claim for STA operating funds to the Santa Cruz County Regional Transportation Commission; and

WHEREAS, the Santa Cruz Metropolitan Transit District's proposed expenditures are in conformity with the Regional Transportation Plan; and

WHEREAS, the level of passenger fares and charges is sufficient to enable the Santa Cruz Metropolitan Transit District to meet the fare revenue requirements of Public Utilities Code Section 99268.2(b); and

WHEREAS, the Santa Cruz Metropolitan Transit District is not precluded by any contract entered into on or after June 28, 1979, from employing part-time drivers or from contracting with common carriers of persons operating under a franchise or license; and

WHEREAS, the sum of the Santa Cruz Metropolitan Transit District's allocations from the State Transit Assistance fund and from the Local Transportation Fund does not exceed the amount the Santa Cruz Metropolitan Transit District is eligible to receive during fiscal year 2007. Such funding, however, shall not relieve the Santa Cruz Metropolitan Transit District of its responsibility pursuant to Section 6735 of the California Code of Regulations, Title 21, Chapter 3; and

WHEREAS, the Santa Cruz Metropolitan Transit District has made a reasonable effort to implement the productivity improvements recommended pursuant to Public Utilities Code Section 99244; and

14.a1

WHEREAS, the Santa Cruz Metropolitan Transit District is making full use of federal funds available under the Intermodal Transportation Efficiency Act of the 21st Century and its amendments:

NOW, THEREFORE, BE IT RESOLVED, that the General Manager of the Santa Cruz Metropolitan Transit District is authorized to submit a claim of in State Transit Assistance funds for FY 2007.

PASSED AND ADOPTED this 27th day of October, 2006 by the following vote:

AYES: Directors -

NOES: Directors -

ABSTAIN: Directors -

ABSENT: Directors -

APPROVED _____

MIKE ROTKIN
Board Chair

ATTEST _____

LESLIE R. WHITE
General Manager

APPROVED AS TO FORM:

MARGARET GALLAGHER
District Counsel

14.a2

**BEFORE THE BOARD OF DIRECTORS OF THE
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT**

Resolution No. _____
On the Motion of Director: _____
Duly Seconded by Director: _____
The Following Resolution is Adopted:

**RESOLUTION OF THE BOARD OF DIRECTORS OF THE
SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
AUTHORIZING AN AMENDED CLAIM TO THE
SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION
FOR TRANSPORTATION DEVELOPMENT ACT FUNDS**

WHEREAS, in accordance with Article 1, Section 99210 of the Public Utilities Code the Santa Cruz Metropolitan Transit District is a transit operator; and

WHEREAS, in accordance with Article 1, Section 99214 of the Public Utilities Code the Santa Cruz County Regional Transportation Commission is the Transportation Planning Agency for Santa Cruz County; and

WHEREAS, in accordance with Article 4, Section 99260(a) of the Public Utilities Code, claims may be filed with the transportation planning agency by transit operators for the support of public transportation systems; and

WHEREAS, in accordance with 6655 of the California Code of Regulations, the Transportation Planning Agency may revise the allocation instruction to the County Auditor for payment to claimants when necessary to reconcile the Transportation Development Act apportionment estimate with actual figures,

NOW, THEREFORE, BE IT RESOLVED, that the General Manager of the Santa Cruz Metropolitan Transit District is authorized to submit an amended claim in the amount of for Transit Operations for FY2007. Said claim accompanies this resolution and is incorporated by reference.

PASSED AND ADOPTED this 27th day of October, 2006 by the following vote:

AYES: Directors -

NOES: Directors -

ABSTAIN: Directors -

ABSENT: Directors -

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Resolution No. _____
Page 2

APPROVED _____
MIKE ROTKIN
Board Chair

ATTEST _____
LESLIE R. WHITE
General Manager

APPROVED AS TO FORM:

MARGARET GALLAGHER
District Counsel

14.62

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT**DATE:** October 27, 2006**TO:** Executive Director, SCCRTC**FROM:** General Manager, SCMTD**SUBJECT: FY 2007 PUBLIC TRANSPORTATION CLAIM DISBURSEMENT
REQUIREMENT**

Disbursement of the Santa Cruz Metropolitan Transit District's amended FY 2007 claims for \$6,165,834 in TDA funds and \$4,720,782 in STA funds is requested as follows:

1. TDA FUNDING FOR FY 2007

TDA	
<u>Disbursement Schedule</u>	
Available	\$ 6,165,834
1st Quarter	\$ 1,541,459
2nd Quarter	\$ 1,541,459
3rd. Quarter	\$ 1,541,459
4th. Quarter	\$ 1,541,459
TOTAL	\$ 6,165,834

2. STA FUNDING FOR FY 2007

STA	
<u>Disbursement Schedule</u>	
Available	\$ 4,720,782
1st Quarter	\$ 1,180,196
2nd Quarter	\$ 1,180,196
3rd. Quarter	\$ 1,180,196
4th. Quarter	\$ 1,180,196
TOTAL	\$ 4,720,782

This schedule will enable the District to fund current year service operations and capital projects as programmed in its FY2007 budget. The STA funds will be used for capital projects only.

**PUBLIC TRANSPORTATION CLAIM
FISCAL YEAR 2007**

TO: SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION
1523 Pacific Avenue
Santa Cruz, CA 95060

FROM: SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
370 Encinal Street, Suite 100
Santa Cruz, CA 95060

This applicant, the Santa Cruz Metropolitan Transit District, qualified pursuant to Section 99203 of the Public Utilities Code, hereby requests in accordance with Article 4, Section 6630 of the California Code of Regulations that its claim for Local Transit Funds be approved in the amount of:

TDA Funding:

Six million, one hundred sixty-five thousand, eight hundred thirty-four dollars (\$6,165,834).

STA Funding:

Four million, seven hundred twenty thousand, seven hundred eighty-two dollars (\$4,720,782).

for Fiscal Year 2007, to be drawn from the local transportation trust fund of the following county in the amount shown below:

<u>COUNTY</u>	<u>PURPOSE</u>	<u>AMOUNT</u>
Santa Cruz	Transportation Development Act	\$6,165,834
Santa Cruz	State Transit Assistance Funds	\$4,720,782

When approved, please transmit this claim for payment. Approval of the claim and payment by the County Auditor to this operator is subject to such monies being on hand and available for distribution, and to the provisions that such monies shall be used only in accordance with the terms of the approved annual financial plan.

SANTA CRUZ METROPOLITAN TRANSIT DISTRICT

BY: _____
LESLIE R. WHITE
General Manager

DATE: October 27, 2006

Santa Cruz Metropolitan Transit District

FY 2007 STA and TDA Funding

Supplemental Information

1. STA Funds

State Transit Assistance (STA) funds are regulated within the Public Utilities Code. Qualifying criteria to use STA funds for transit operations in §99314.6 state that a transit operator must limit annual increases in operating costs per vehicle revenue hour to the established Consumer Price Index. Because fuel cost increases and contract labor rates have typically exceed the annual CPI, particularly in the previous 5 years, METRO does not meet this limiting criteria and does not use STA funds for transit operations. STA funds allocated to METRO are used exclusively to fund capital projects.

In FY 2007, METRO will use the entire allocation of STA Funds for MetroBase property acquisition as shown below:

FY 2007 STA Funds	Project
\$4,720,782	MetroBase ROW

2. TDA Funds

TDA Statutes also establish qualifications for the receipt of TDA funds. As detailed in the justification submitted with the initial STA and TDA claims in June and duplicated below, Santa Cruz METRO meets the criteria for the receipt of TDA funds.

a. Revenue Qualification

The California Code of Regulations Article 4, Section 6633 provides that an operator that operated public transit service before July 1, 1974, may qualify for TDA funds under either Public Utilities Code Section 99268.1 (the 50 percent expenditure limitation) or 99268.2 (the fare and local support ratios), unless the operator was granted a waiver from the 50 percent expenditure limitation for 1978-79.

SCMTD was established in 1969. Pursuant to the Transportation Development Act, Section 99268.1 the SCMTD is defined as an older operator. Therefore, SCMTD may qualify for TDA funds under either PUC Section 99268.1 or 99268.2. SCMTD qualifies and meets the requirements in both PUC Sections 99268.1 and 99268.2 as provided in paragraphs b.1 and b.2 below.

14.d.1

b. SCMTD Compliance with 50% Expenditure Limitation for Older Operations (PUC Section 99268 and 99268.1)

PUC Section 99268 states: “The expenditure of the funds received under this article by an operator may in no year exceed 50 percent of the amount required to meet operating, maintenance, and capital and debt service requirements of the system after deduction therefrom of approved federal grants estimated to be received and funds estimated to be allocated pursuant to Section 99314.5.”

PUC Section 99268.1 states: “Commencing with claims for the 1980-81 fiscal year, an operator that was in compliance with Section 99268 during the 1978-79 fiscal year in order to be eligible for funds under this article shall be eligible for such funds in any fiscal year, if it remains in compliance with that section during the fiscal year. The determination of compliance for any fiscal year shall be made in the same manner as the determination was made for the 1978-79 fiscal year, except for the exemption provided under Section 99267.5. An allowance for the depreciation shall be made in the same manner as provided in the 1978-79 fiscal year.”

The calculated 50% expenditure limitation according to PUC Sections 99268 and 99268.1 is show below with revised amounts to reflect the final budget and amended claim amounts.

Expenditure Limitation for FY 2007	
Operating Budget	\$35,960,000
Federal Grants	3,229,078
STA (Capital only)	4,720,782
SubTOTAL	28,010,140
SCMTD 50% Limit	\$14,005,070
TDA Claim	6,165,834

Therefore, this claim satisfies the 50 percent expenditure limitation of \$14,005,070 in 2007 TDA funds since the SCMTD’s claim for TDA funds totals \$ \$6,165,834 . The District’s ½ cent sales tax and fare box revenue will contribute to the operating budget in FY 2007.

The following page gives a comparison of METRO’s FY 2006 performance measures with the previous 2 years.

14.d2

METRO OPERATIONS
PERFORMANCE MEASURES – FY 2006, FY 2005, FY 2004

	2005-06*	2004-05	2003-04
Directional Route Miles	499	499	499
Annual Passengers	4,769,437	5,596,884	5,823,607
Annual Revenue Hours	187,153	215,903	233,003
Annual Revenue Miles	2,846,968	3,280,543	3,398,935
Average Passengers Per Weekday	17,765	18,300	19,319
Number of Bus Stops	1,000	992	1,070
Number of Routes	40	40	47
Total Active Fleet	113	114	111
Maximum In Service Buses (WD)	73	73	72
Total District Employees	325	306	290
Passengers Per Hour	25.5	25.9	25.0
Passengers Per Mile	1.7	1.7	1.7
Total Cost Per Passenger	\$7.09	\$6.03	\$5.12
Revenue Per Passenger	\$0.63	\$0.63	\$0.66
Subsidy Per Passenger	\$6.46	\$5.40	\$4.45
Passenger Revenue			
Farebox Revenue	\$2,285,137	\$2,733,415	\$2,780,320
Total Fares	\$2,995,665	\$3,535,278	\$3,856,173
Contract	\$2,029,724	\$2,285,492	\$1,645,252
Hwy 17	\$615,227	\$643,002	\$375,972
VTA Subsidy	\$351,414	\$341,119	\$524,028
AMTRAK Subsidy	\$67,699	\$72,247	N/A
TOTAL	\$8,344,866	\$9,610,553	\$6,401,425
Other Revenue			
Sales Tax	\$16,654,432	\$15,686,399	\$15,188,227
Federal Transit Administration	\$3,087,031	\$3,043,159	\$2,870,139
Transit Development Act	\$5,740,612	\$5,413,251	\$5,337,724
TOTAL	\$25,482,075	\$24,142,809	\$23,396,090
TOTAL OPERATING BUDGET	\$33,826,941	\$33,753,362	\$29,793,405
*UTU Bus Operators were on strike from September 27 - November 3, 2006			
Annual Passengers = NTD plus special shuttles			

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