BID DOCUMENTS COVER SHEET

CONTRACT DOCUMENTS

FOR

C-633 - SEISMIC RETROFIT, PROJECT 1

at

CONTRA COSTA COLLEGE

2600 Mission Bell Drive, San Pablo, CA. 94806

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

Consist of the following:

DSA File #7-C1
DSA Application #01-113799

Architect:
Noll & Tam Architects and Planners
729 Heinz Ave.
Berkeley, CA 94710

April 8, 2014

VOLUME 142
SECTION 00007
SEALS PAGE AND DSA FORMS

Structural Engineer: Justin Fahey
Thornton Tomasetti
650 California Street, Suite 1400
San Francisco, CA 94108

Signature

04-02-2014
Date

Seal

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
Architect: Christopher Noll
Noll & Tam Architects and Planners
729 Heinz Ave
Berkeley, CA 94710

Signature

Date 3/2/19

Seal
Mechanical Engineer: Rick Russell
Interface Engineering
717 Market Street, Suite 500
San Francisco, CA 94103

Signature

Date 4/1/14

Seal

Electrical Engineer: Thomas Phuong
Interface Engineering
717 Market Street, Suite 500
San Francisco, CA 94103

Signature

Date 4/1/14

Seal

END OF SECTION
### Project Information

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Signature of A/E: [Signature]
Date: 4/2/14

For 90 Day Letter
Preparation By: ____________________________
Date: ____________________________

(Rev. 5/07)
## SOILS

### 1. GENERAL:
- Verify that:
  - site has been prepared properly prior to placement of controlled fill and/or excavations for foundations,
  - foundation excavations are extended to proper depth and have reached proper material, and
  - materials below footings are adequate to achieve the design bearing capacity.

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<th>TEST OR SPECIAL INSPECTION</th>
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<td>* By geotechnical engineer or his or her qualified representative.</td>
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### 2. COMPACTED FILLS:
- Perform qualification testing of fill materials.
- Verify use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.

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<th>TYPE</th>
<th>PERFORMED BY</th>
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<td>* Under the supervision of the geotechnical engineer.</td>
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<td>Lab*</td>
<td>* Under the supervision of the geotechnical engineer.</td>
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## CONCRETE

### 7. CAST IN PLACE CONCRETE

#### Material Verification and Testing:
- Verify use of required design mix.
- Test reinforcing steel.
- Perform slump, temperature, and (where required) air content tests.
- Test concrete (compression). Inspection:

<table>
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<tr>
<th>REQUIRED</th>
<th>TEST OR SPECIAL INSPECTION</th>
<th>TYPE</th>
<th>PERFORMED BY</th>
<th>CODE REFERENCE AND NOTES</th>
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</table>

* in the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.
   Continuous 
   PI
   * May be performed by a special inspector when specifically approved by DSA.

g. Welding of reinforcing steel.
   Provide special inspection per STEEL, category 19.1(c) & (e) and/or 19.2(g) (h) below.

  - 11. POST-INSTALLED ANCHORS:
  
  a. Inspect installation of post-installed anchors
     Continuous 
     PI 
     Table 1704A.4

  b. Test post-installed anchors.
     Test 
     Lab 1916A.7 (1916.1.11”).

  + MASONRY

  - STEEL

  Table 1704A.3

  - 17. STRUCTURAL STEEL AND COLD-FORMED STEEL USED FOR STRUCTURAL PURPOSES

  Material Verification:

  a. Verify that all materials are appropriately marked and that:
     - Mill certificates indicate material properties that comply with requirements.
     - Material sizes, types and grades comply with requirements.
     Periodic 
     PI
     * By special inspector when performed off-site; by project inspector for steel shipped directly to project site without welding or fabrication.

  b. Test unidentified materials
     Test 
     Lab 2203A.1 (2203.1"), ASTM A370.

  c. Examine seam welds of structural tubes and pipes
     Periodic 
     SI
     * See DSA IR 17-3.

  d. Verify member locations, bracing and all details constructed in the field.
     Continuous 
     PI

  e. Verify stiffener locations, connection tab locations and all construction details fabricated in the shop.
     Periodic 
     SI

  - 19. WELDING:

  Verification of Materials, Equipment, Welders, etc:

  a. Verify weld filler material identification markings per AWS designation listed on the DSA approved documents and the WPS.
     Periodic 
     SI

  b. Verify weld filler material manufacturer’s certificate of compliance.
     Periodic 
     SI

  c. Verify WPS, welder qualifications and equipment.
     Periodic 
     SI 
     See DSA IR 17-3.

  - 19.1 SHOP WELDING:

  a. Inspect groove, multi-pass, and fillet welds > 5/16"
     Continuous 
     SI
     Per AISC 360 (and AISC 341 as applicable), See DSA IR 17-3.

  b. Inspect single-pass fillet welds ≤ 5/16"
     Periodic 
     SI
     Per AISC 360 (and AISC 341 as applicable), See DSA IR 17-3.

  c. Verification of reinforcing steel weldability
     Periodic 
     SI 1704A.4.1; verify carbon equivalent reported on mill certificates. See DSA IR 17-3.

  d. Inspect welding of reinforcing steel.
     Continuous 
     SI 1704A.3.1.3, 1704A.3.1.4 and Table 1704A.3 Item 5b. AWS D1.4. See DSA IR 17-3.

  - 19.2 FIELD WELDING:

  a. Inspect groove, multi-pass, and fillet welds > 5/16"
     Continuous 
     SI
     Per AISC 360 (and AISC 341 as applicable), See DSA IR 17-3.

  b. Inspect single-pass fillet welds ≤ 5/16"
     Periodic 
     SI
     Per AISC 360 (and AISC 341 as applicable), See DSA IR 17-3.

  c. Inspect end-welded studs (ASTM A-108) installation (including bend test)
     Periodic 
     SI
     Per AISC 360 (and AISC 341 as applicable), See DSA IR 17-3.

  d. Verification of reinforcing steel weldability
     Periodic 
     SI 1704A.4.1; verify carbon equivalent reported on mill certificates.

  e. Inspect welding of reinforcing steel.
     Continuous 
     SI 1704A.3.1.3, 1704A.3.1.4 and Table 1704A.3 Item 5b. AWS D1.4

* in the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2016 CBC Sec. 1.9.2.2.
### 20. NONDESTRUCTIVE TESTING:

| X | b. Magnetic Particle | Test | Lab       |

**WOOD**

**OTHER**

Section 1704A.15
**Statement of Structural Tests and Special Inspections**

**2010 CBC**

**Summary of Verified Reports Required:**

Note: Project Inspector, contractor, architect and engineer verified reports are always required (Form DSA-6 or DSA-6A/E as applicable).

1. Soils testing and Inspection: Geotechnical Verified Report - Form DSA-293
2. All Structural Testing: Laboratory Verified Report - Form DSA-291
3. Concrete Batch Plant Inspection: Special Inspection Verified Report - Form DSA-292
4. Shop Welding Inspection: Special Inspection Verified Report - Form DSA-292
5. Field Welding Inspection: Special Inspection Verified Report - Form DSA-292

**KEY to Columns**

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<td>Continuous – Indicates that a continuous special inspection is required</td>
<td>GE – Indicates that the special inspection is to be performed by a registered geotechnical engineer or his or her authorized representative</td>
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<tr>
<td>Periodic – Indicates that a periodic special inspection is required</td>
<td>Lab – Indicates that the test is to be performed by a testing laboratory accepted in the DSA laboratory Evaluation and Acceptance (LEA) Program</td>
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<td>PI – Indicates that the special inspection is to be performed by the project inspector</td>
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(Note: The difference between “tests” and “special inspections” is addressed in IR 17-4)

---

**Identification Stamp**

**DIV OF THE STATE ARCHITECT**

**APP. # 01-113799**

**AC N/A F/LS N/A SS V1/0100**

**DATE 4/2/14**

---

**DSA-103**

(rev 03-19-12)

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.
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- **SECTION 00100**  NOTICE INVITING BIDS
- **SECTION 00200**  INSTRUCTIONS TO BIDDERS
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- **SECTION 00650**  NOTICE TO PROCEED
- **SECTION 00700**  GENERAL CONDITIONS

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- **SECTION 01050**  FIELD ENGINEERING
- **SECTION 01140**  WORK RESTRICTIONS
- **SECTION 01311**  PROJECT MANAGEMENT AND COORDINATION
- **SECTION 01312**  PROJECT MEETINGS
- **SECTION 01340**  ADMINISTRATIVE FORMS AND LOGS
- **SECTION 01400**  QUALITY CONTROL REQUIREMENTS
- **SECTION 01415**  MITIGATION MONITORING REGULATORY REQUIREMENTS
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SECTION 01 73 10 CUTTING AND PATCHING OF ROOFING AND PLASTER
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SECTION 02081 LEAD-CONTAINING PAINT REMOVAL AND LEAD-RELATED CONSTRUCTION
SECTION 02082 PCB CONTAINING MATERIALS ABATEMENT AND DISPOSAL
SECTION 02085 UNIVERSAL WASTE ABATEMENT AND DISPOSAL
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HM2.04 PHYSICAL SCIENCE HAZARDOUS MATERIALS PLAN
HM2.06 PHYSICAL SCIENCE NORTH WING HAZARDOUS MATERIALS PLAN
HM2.07 MAINTENANCE WAREHOUSE HAZARDOUS MATERIALS PLAN
HM2.08 PRESS BOX HAZARDOUS MATERIALS PLAN

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DIVISION 22 - PLUMBING
SECTION 22 00 00 PLUMBING BASIC REQUIREMENTS
SECTION 22 10 00 PLUMBING PIPING

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)
SECTION 23 00 00 HEATING, VENTILATING AND AIR CONDITIONING (HVAC) BASIC REQUIREMENTS
SECTION 23 05 16 EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING
SECTION 23 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT
SECTION 23 05 48 VIBRATION AND SEISMIC CONTROLS FOR HVAC EQUIPMENT
SECTION 23 07 00 HVAC INSULATION
SECTION 23 11 23 FACILITY FUEL - NATURAL GAS PIPING AND SYSTEMS
SECTION 23 21 13 HVAC PIPING
SECTION 23 31 00 HVAC DUCTS AND CASINGS

DIVISION 26 - ELECTRICAL
SECTION 26 00 00 ELECTRICAL BASIC REQUIREMENTS
SECTION 26 05 09 EQUIPMENT WIRING
SECTION 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
SECTION 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS AND EQUIPMENT
SECTION 26 05 33 RACEWAYS
SECTION 26 05 34 BOXES
SECTION 26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
SECTION 26 27 26 WIRING DEVICES

DIVISION 31 EARTHWORK
SECTION 31 00 00 EARTHWORK
SECTION 31 11 00 CLEARING AND GRUBBING

DIVISION 32 EXTERIOR IMPROVEMENTS
SECTION 32 13 13 SITE CONCRETE WORK

END OF SECTION 00010
SECTION 00015
PROJECT DIRECTORY

ARCHITECT:  Christopher Noll
Noll & Tam Architects and Planners
729 Heinz Ave.
Berkeley, CA 94710
(510) 649-8295

STRUCTURAL ENGINEER:  Justin D. Fahey
THORNTON TOMASETTI
650 CALIFORNIA STREET, 14th FLOOR
SAN FRANCISCO, CA 94108
415-365-6900

MECHANICAL ENGINEER:  Rick Russell
INTERFACE ENGINEERING
717 MARKET STREET, SUITE 500
SAN FRANCISCO, CA 94103
415-489-7240

ELECTRICAL ENGINEER:  Thomas Phuong
INTERFACE ENGINEERING
717 MARKET STREET, SUITE 500
SAN FRANCISCO, CA 94103
415-489-7240

OWNER:  Contra Costa Community College District
500 Court Street
Martinez, CA 94553
925-229-1000

FACILITIES PLANNING:  Ray Pyle, Chief Facilities Planner
925-229-6842

Ben Azarnoush, Director of Construction Program Controls
925-229-6844
PROJECT MANAGER:  Ron Johnson
Critical Solutions, Inc.
1801 Oakland Blvd., Suite 300
Walnut Creek, CA 94596
925-944-5060

CONSTRUCTION MANAGER:  John Leary
Critical Solutions, Inc.
1801 Oakland Blvd., Suite 300
Walnut Creek, CA 94596
925-944-5060

CCC – BUILDINGS & GROUNDS:  Bruce King, Buildings & Grounds Manager
925-229-1000 x44853

CCC – INFORMATION TECHNOLOGY:  James Eyestone, Technology Systems Manager
925-229-1000 x43866

END OF SECTION 00015
SECTION 00016

CONTRA COSTA COLLEGE CAMPUS MAP

PARKING
Student parking lots are Lots 1, 2, 4, 5, 10, 12, 14, 16, and the Parking Annex.
After 4:00pm students with a permit may also park in staff parking spaces in Lots 5, 10, and 15 and along Campus Drive from the AA Building to Lot 14.
Bike racks located near Men's Locker Room (ML), behind Humanities (H), between Biology (B) & Physical Science (PS) Buildings.
Students may not park at any time in Lots 3, 8, 9, 11, 12, and 13.
Parking is regulated from 7:00 am - 10:00 pm Monday through Thursday, 7:00 am - 5:30 pm on Friday.

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
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NOTICE IS HEREBY GIVEN that the Governing Board of the Contra Costa Community College District (District), Martinez, California, will receive sealed bid proposals for the furnishing of all labor, materials, equipment, transportation and services for the construction of the project entitled C-633, Seismic Retrofit, Project 1.

Construction Cost Estimate (Range): $1,100,000 to $1,600,000; License Required: B-General Building Contractor;

General construction to seismically retrofit multiple buildings located on Campus. Other Work includes, but is not limited to, abatement, temporary construction, demolition, structural, electrical, mechanical, signage and architectural finishes.

Project Documents including but not limited to plans, specifications, addenda, bidders lists, bid results, etc. can be viewed online at the Contra Costa Builders Exchange at: http://onlineservice.com/PublicWorks/ProjectList.aspx?Agency=49

The viewing software is free and can be downloaded from the website. If you are interested in receiving project notifications automatically, please register by clicking on the “Register” button on the Project Details page. Plan page copy service is available and can be ordered online through the Contra Costa Builders Exchange. Please feel free to contact the Contra Costa Builders Exchange at: 2440 Stanwell Drive, Suite “B”, Concord, California 94520, Tel: (925) 685-8630.

Hard copies of plans and specifications shall be available for purchase at ARC located at 5753 Pacheco Blvd., Pacheco, California, Phone: (925) 682-6930. To purchase plans at ARC’s Public Planroom website use the link: https://order.e-arch.com/archEOC/PWELL Main.asp?mem=23. Go to the Public Planroom for access to the documents without a login required. Payment for hardcopies shall be the responsibility of the bidder, and shall be made directly to ARC. The District does not provide hardcopies of bid documents or reimburse cost of printing, delivery, or any expenses related to the bidding process.

For information directly from the District, you may also log in to the District Website: https://insite.4cd.edu/webapps/PurchasingViewBids. Project documents available include but are not limited to plans, specifications, addenda, bidders lists, bid results, etc., and can be viewed on this District webpage.

All questions related to this project must be in writing and are directed to:

Jovan Esprit, Contracts Manager
Contra Costa Community College District
500 Court St., Martinez, CA 94553
Email: jesprit@4cd.edu
Facsimile: 925-370-7512;

Each bid shall be made on the bid form, which is included in the Bid Documents and when submitted, shall be accompanied by a Bid Bond or Certified Cashier’s Check in the amount of 10% of bid (made payable to the Contra Costa Community College District). The District reserves the right to forfeit Bid Bond submitted for failure of the successful bidder to secure Payment & Performance Bonds.
Bids must be received by the District prior to the time and by the date noted above. Bids that are not received by the District prior to the time and by the date noted above will not be accepted, and will be returned to the Bidder unopened.

The successful bidder will be required to furnish a labor and material bond in an amount equal to one hundred percent (100%) of the contract price and a faithful performance bond in an amount equal to one hundred percent (100%) of the contract price, said bonds to be secured from a surety company acceptable to the Contra Costa Community College District and authorized to execute such surety in the State of California.

This project is a public works project and is subject to prevailing wage rate laws. A copy of the prevailing rates of wages is on file with the Contracts & Purchasing Office of the Contra Costa Community College District. Said rates of wages shall be included in the contract for the work by this reference.

Attention is directed to Section 4100 through 4113 of the Public Contract Code concerning subcontractors.

Attention is directed to Section 00600, Construction Agreement, Article 5, and GENERAL CONDITIONS, Article 8, paragraphs 8.4.1 and 8.4.2, regarding liquidated damages. Liquidated Damages shall be set for $3,000 Dollars for each calendar day the work is delayed beyond the Contract Substantial Completion date. The Governing Board of the Contra Costa Community College District reserves the right to reject any and all bids and/or waive any informality or irreguality in any bid received. No bidder may withdraw their Bid for a period of ninety (90) days after the date set for opening thereof.

END OF SECTION 00100
SECTION 00200

INSTRUCTIONS TO BIDDERS

1.1 ISSUING OF DOCUMENTS

A. Complete sets of Bidding Documents may be purchased at ARC Reprographic Services located at 5753 Pacheco Blvd., Pacheco, California, (925) 682-6930 or via the ARC Reprographic Services internet website, www.e-arc.com. Payment shall be made to ARC Reprographic Services for the cost of printing. To order documents via the internet, log on to https://order.e-arc.com/arcEOC/PWELL_Main.asp?mem=23. In the lower left side of the webpage under “PUBLIC PLANROOM”, click the “GO->” button and select the documents you need to order.

B. Bidding Documents may be examined at the Contra Costa Community College District, 500 Court Street, Martinez, CA 94553. By Appointment: Georgette Stewart, Facilities Department, phone: (925) 229-6847.

C. Project documents including but not limited to plans, specifications, addenda, bidders lists, bid results, etc. can be viewed at online plan service through the Contra Costa Builders Exchange at: http://onlineplanservice.com/PublicWorks/ProjectList.aspx?Agency=49

1.2 QUALIFICATIONS OF BIDDERS

A. Bidders may be required to furnish evidence satisfactory to the District and the Architect that he has sufficient means and has had sufficient experience in the class of work called for to enable him to complete the Contract in a satisfactory manner.

B. Bidders shall be Contractors properly licensed in accordance with the laws of the State of California.

C. The successful Bidder shall furnish satisfactory Certificates of Insurance coverage as specified in the Contract Documents.

1.3 RECEIPT AND OPENING OF BIDS

A. Contra Costa Community College District hereinafter referred to as the District, will receive Bids at the same time and place specified in the Notice inviting Bids.

B. Complete the Bid Form included in the Project Manual.

C. The envelopes containing the Bids shall be sealed, addressed to the District, and designated as “C-633 - Seismic Retrofit, Project 1” – Contra Costa Community College District”. The envelope shall contain the name and address of the Bidder.

D. Bids that are mailed shall have the previously described envelope placed inside an envelope addressed to: CONTRA COSTA COMMUNITY COLLEGE DISTRICT, 500 Court Street, Martinez, CA 94553 ATTENTION: JOVAN ESPRIT, Contracts Manager. Bids should be mailed in time to be received prior to the time set forth in the Advertisement for Bids.

E. Bids which are conditional (or which make alterations, omissions, or reservations to the terms of the Bidding Documents) may be rejected as non-responsive.
F. All monetary figures are required, both in writing and in numerals. In event of conflict between written quotations and numerical quotations, written quotations shall govern.

G. Type or print all bid data legibly in ink except signatures which shall be in script. Mistakes may be crossed out and corrections inserted, if each is initialed in ink by signer of Bid.

H. Bidder’s business address and signature shall be on the Bid. A Bid by a partnership shall furnish the full names of partners and be signed in the partnership name by one member of the partnership, or by authorized representative, followed by the signature and designation of the person signing. Bids by corporations, with corporate seal affixed, shall be signed with the legal name of the corporation followed by the name of the state of incorporation and by the signature and designation of the person authorized to bind it to the matter. The name of each person signing shall also be typed or printed below the respective signatures. When required by the District, satisfactory evidence of authority of the office signing in behalf of the corporation shall be furnished.

I. No Bids will be received after the date and time set forth in the Notice Inviting Bids.

1.4 BID SECURITY

A. Submit with the Bid a Bid Security in the amount of 10 percent (10%) of the Bid.

B. The District reserves the right to forfeit the Bid Bond submitted for failure of the successful bidder to secure Payment & Performance Bonds.

1.5 SURETY BONDS

A. The successful Bidder shall furnish a Labor and Material Payment Bond in the amount equal to one hundred percent (100%) of the Contract Price and a faithful Performance Bond in the amount equal to 100 percent (100%) of the Contract Price as security for the successful performance of the work and payment of persons performing labor and furnishing materials. The Bonds shall be executed by a surety company or companies acceptable to the District and authorized to execute such in the State in which the Project is located and shall be furnished within 10 days after Notice of Acceptance of said Bid. Surety shall be made in favor of the District and shall cover the guarantee periods as well as the construction period.

1.6 WITHDRAWAL OR REVISIONS OF BID

A. This Bid may be withdrawn or revised prior to the scheduled time for receipt. Bids not withdrawn prior to the scheduled time for receipt may not be withdrawn for a period of 90 days.

1.7 BID PROTESTS

A. Inquiries or questions based on alleged patent ambiguity of the plans, specifications or estimate must be communicated as a bidder inquiry prior to bid opening. Any such inquiries or questions, submitted after bid opening, will not be treated as a bid protest.

B. Bidder may file a protest with the District against the Bid of other Bidder or Bidders ("Bid Protest") subject to the provisions of this Article. The procedures and time limits set forth in this Article are mandatory and are a Bidder's sole and exclusive remedy in protesting other
Bidders’ bids. Failure to comply with these procedures shall constitute a waiver of any right to pursue a Bid Protest, or to contest the District’s award of the contract for the work that is the subject of the Bid, in any legal proceeding before any authority with jurisdiction.

C. Bid Protests and Responses shall be governed by the following time limitations:

1. Bidder must deliver any Bid Protest to the District in writing before 2:00PM, five (5) working days after the date of bid opening. The District will reject any Bid Protest not received by the District by this deadline. Bidder must concurrently deliver a copy of its Bid Protest to all Bidders against whose Bids the Bid Protest is directed. The Bidder must include with its Bid Protest written proof to the District’s satisfaction that Bidder has delivered a copy of its Bid Protest to the other Bidder whose bid is the subject of the Bid Protest.

2. A Bidder whose Bid is the subject of a Bid Protest must deliver its written response, if any, ("Response") to the District, before 2:00PM, five (5) working days after the date of bid opening. The District will reject any Response not received by the District by this deadline.

D. Delivery of Bid Protest or Response:

1. Bidder may deliver a Bid Protest to the District by personal delivery or electronic transmission such as by facsimile. Bidder is solely responsible for ensuring that the District receives any Bid Protest or Response by the deadlines set forth herein.

2. The District will not consider Bid Protests or Responses by telephone conversation or any other non-written communication.

3. Bidder shall submit any Bid Protest or Response to: David Wetmore, Director of Purchasing and Contract Services, Contra Costa Community College District, 500 Court Street, Martinez, CA 94553, Facsimile: 925-370-7512.

E. Content of Bid Protest:

1. A Bid Protest must state the basis for the protest and provide supporting evidence.

2. A Bid Protest must refer to the specific portion of the Bid that forms the basis of the protest.

3. A Bid Protest must include the name, address, and telephone number of the person representing the protesting Bidder.

4. A Bid Protest must be clearly identified as a Bid Protest.

1.8 AWARD AND REJECTION OF BIDS

A. In awarding or rejecting Bids, the District reserves the following rights:

1. Identification of successful Bidder will not be determined at time of opening Bids.

2. To obtain opinion of counsel on legality and sufficiency of bids.

3. To reject all Bids, to re-bid, or waive irregularities or informalities in a Bid, and to accept or reject alternates.

4. Request proof that the successful Bidder can provide performance and payment bonds as required.
1.9 EXAMINE DOCUMENTS AND VISIT SITE

A. Before submitting a Bid, the Bidder shall examine the Bidding Documents, visit the site of the work, attend the required site visit arranged by the District and obtain Certification of Attendance signed by the District, ascertain existing conditions and limitations, including those of labor, and include in the Bid a sum to cover the cost of all items described in the Contract Documents.

B. No consideration will be granted for alleged misunderstanding of the materials to be furnished or work to be done. The tender of a Bid carries with it the agreement to terms and conditions referred to in the Contract Documents.

1.10 DISCREPANCIES, AMBIGUITIES, OR CONFLICTS

A. If the Bidder is in doubt as to the true meaning of any part of the Contract Documents; finds discrepancies, errors or omissions therein; or finds variances in any of the Contract Documents with applicable rules, regulations, ordinances and/or laws, a written request for an interpretation or correction thereof must be submitted to the District’s Contract Manager. Bidders are solely responsible for submitting to District’s Contract Manager such request. Ambiguities or inconsistencies arising as a result of separation of sections or portions of the drawings or specifications by or for subcontractor bidding shall not relieve the Contractor for providing the complete Work without increase to or adjustment in the Contract Price or the Time for performance. Interpretations or corrections of the Contract Documents will be by written addendum issued by the Architect. No person is authorized to render an oral interpretation or correction of any portion of the Contract Documents to any Bidder, and no Bidder is authorized to rely on any such oral interpretation or correction. Failure to request interpretation or clarification of any portion of the Contract Documents pursuant to the foregoing is a waiver of any discrepancy, defect or conflict therein.

1.11 ADDENDA

A. Cost for work included in any Addenda issued during the time of bidding shall be included in the Bid, and will become a part of the Contract. List Addenda received as indicated on the Bid Form.

1.12 FORM OF AGREEMENT

A. The form of agreement to be used for the Contract is provided by the District and is included in the Project Manual.

1.13 AWARD OF CONTRACT

A. The District will be allowed a period of ninety (90) days after Bid Opening Date for evaluating the Bids.

B. Bidders of record will be notified of the results of the District’s evaluation of bids and Award of Contract, if any.

C. The contractor shall begin work within ten (10) calendar days of receipt of Notice to Proceed.

END OF SECTION 00200
SECTION 00210
INFORMATION AVAILABLE TO BIDDERS

PART 1 - REPORT AND INFORMATION

1.1 Existence of reports, record drawings, and utility surveys: Contra Costa Community College District, its consultants, and prior contractors may have collected documents providing a general description of the site and conditions of the work. These documents may consist of geotechnical reports for and around the site, record drawings, utility drawings, and information regarding underground utilities. These reports, documents and other information are not part of the Contract Documents and do not show new work to be constructed, rather, they show existing conditions that Contractor may have to address as part of its construction planning.

1.2 Available Documentation: The following existing documentation is available for review through District office for this project:

A. Existing building Drawings

B. Campus Utilities Maps
   1. CC College Survey by LCC Inc; issued July 6, 2012

C. Hazardous Materials Survey Report

D. Civil Survey

1.3 Contractor shall acknowledge and accept that the documents are not a part of the Contract Documents and are made available to bidders for reference only. The District and its representatives are not responsible for any and all discrepancies between the documents and the existing and actual as-built conditions, and do not guarantee the accuracy of the documents.

1.4 The District and Architect assume no responsibility for the completeness or accuracy of the documents or the records compiled there from and the interpretations made from the documents. There is no express or implied guarantee that the conditions indicated in the documents are representative of those existing throughout the building and/or site Conditions differing substantially from those indicated may be encountered.

END OF SECTION 00210
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SECTION 00300
BID PROPOSAL FORM

PROJECT NUMBER / NAME: C-633 Seismic Retrofit, Project 1

CAMPUS / LOCATION: Contra Costa College, 2600 Mission Bell Drive, San Pablo, CA 94806

DISTRICT: CONTRA COSTA COMMUNITY COLLEGE DISTRICT
500 Court St, Martinez, CA 94553

Herein Referred to as "District"

1. INTRODUCTION

A. The Bidder proposes to perform the Work for the Contract Sum and within the proposed Contract Time, based upon an examination of the site and the Bid and Contract Documents.

B. The Bidder certifies this Bid is submitted in good faith.

C. The Bidder agrees that the Contract Sum and other proposed terms will be considered in evaluating Bids and may be negotiated and adjusted before awarding of Contract.

D. The signed copy of the Certification of the Visit to the Site shall be attached to the Bid Form Submittal.

E. A fully executed Statement of Bidder’s Qualifications signed by an authorized officer of the Bidder submitting the Bid shall be attached to the Bid Form.

F. A fully executed Non-Collusion Affidavit signed by an authorized officer of the Bidder submitting Bid shall be attached to the Bid Form.

G. The District shall award the contract to the lowest responsive and responsible Bidder. The evaluation of the low bid shall be based on the total of Item 2.A Base Bid.

H. The District reserves the right to award the Additive/Deductive Alternates, if any, through change orders as budget allows within 30 calendar days after the Award of Contract.

2. CONTRACT SUM

A. BASE BID
   For labor, materials, bonds, fixtures, equipment, tools, transportation, services, sales taxes, and other costs necessary to complete the general construction in accordance with the Contract Documents, for a stipulated Contract Sum in the amount of:

   ____________________________________________________________________ Dollars ($ _________________ )
3. ALTERNATES - NONE

4. COMPLETION TIME

A. For establishing the Date of Final Completion the contract time for the Base Bid shall be as indicated in Section 00600, Construction Agreement. This time may be subject to modification to facilitate the work, as mutually agreed upon at a later date.

B. The Bidder certifies that the Bid is based on the Contract Time for completion as stated in Section 00600, Construction Agreement. Bidder further certifies that the Base Bid amount is sufficient to cover all labor, materials, central office and construction site overhead, profit, and all other costs related to the completion of the Project for the entire Project construction time for both the General Contractor and all Subcontractors, as stated above in paragraphs 2 and 3.

5. ADDENDA

A. The Bidder acknowledges receipt of the following Addenda, and certifies the Bid has provided for all modifications and considerations required therein.

   None [ ]

Addendum No.: ________ dated ________________

Addendum No.: ________ dated ________________

Addendum No.: ________ dated ________________

Addendum No.: ________ dated ________________

Addendum No.: ________ dated ________________

B. List of Additional Addenda Attached: Yes [ ] No. [ ].

6. DESIGNATION OF SUBCONTRACTORS

A. The Bidder has set forth a complete list indicating the type of work, name, and business address of each Subcontractor who will perform work in excess of one-half of one percent of the Contract Sum.

B. Any portion of the work in excess of the specified amount having no designated Subcontractor shall be performed by the Bidder.

C. Substitution of listed Subcontractors will not be permitted unless approved in advance by the District.

D. Prior to signing the Contract, the District reserves the right to reject any listed Subcontractor.
<table>
<thead>
<tr>
<th>Type of Work</th>
<th>Subcontractor's Business Address</th>
<th>License #</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
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</tr>
</tbody>
</table>

E. Complete list of Subcontractors is attached: Yes [ ] No [ ]

F. Continuation list of Subcontractors is attached: Yes [ ] No [ ]

7. ACCEPTANCE AND AWARD

A. The District reserves the right to reject this Bid and to negotiate changes before or after execution of the Contract. This Bid shall remain open and shall not be withdrawn for a period of 90 days after Bid Opening date.

B. If written notice of acceptance of this Bid is mailed or delivered to the Bidder within 90 days after the date set for the receipt of this Bid, or other time before it is withdrawn, the Bidder will execute and deliver to the District a Contract prepared by District with the required Surety Bonds and Certificates of Insurance, within 10 days after personal delivery or deposit in the mail of the notification of acceptance.

C. Notice of acceptance or request for additional information may be addressed to the Bidder at the address provided.

8. BID SECURITY

A. The required 10 percent (10%) Bid Security for this Bid is attached in the form of:

( ) Bid Bond Issued By: ______________________________

( ) Certified or Cashier's Check No. ______________________________

Issued by: ________________________________________________

9. BIDDER'S BUSINESS INFORMATION

A. Individual [ ]:

Personal Name: ____________________________________________

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
Business Name: ________________________________

Address: ___________________________________

____________________________________________ Zip Code: __________

Telephone: __________________________________

Fax Number: __________________________________

B. Partnership [ ]:

Co-partners' Names: __________________________

Business Name: ______________________________

Address: ___________________________________

____________________________________________ Zip Code: __________

Telephone: __________________________________

Fax Number: __________________________________

C. Corporation [ ]:

Firm Name: _________________________________

Address: ___________________________________

____________________________________________ Zip Code __________

Telephone: __________________________________

Fax Number: __________________________________

State of Incorporation: _______________________

President: _________________________________

Secretary: ________________________________

Treasurer: _________________________________

Manager: _________________________________
D. Power of Attorney:  
Name:__________________________  
Title:__________________________  

E. Contractor License No. ___________State of___________

F. Bidder is submitting this proposal on behalf of a Joint Venture. Names, license numbers, and relevant information are given on a separate attachment:
   Yes [ ] No [ ].

G. Upon request, furnish appropriate documentation to substantiate and/or support the data given.

10. The undersigned hereby certifies under penalty of perjury under the laws of the State of California that all the information submitted by the Bidder in connection with this Bid and all the representations herein made are true and correct.

   Executed this day of ____________________________

Contractor's License No. ____________________________ Expiration Date ____________________________

__________________________
Firm Name

__________________________
Signature

__________________________
By (Print or Type Name)

__________________________
Title

End of Section 00300
Section 00350

NONCOLLUSION AFFIDAVIT
(TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID)

State of California
County of Contra Costa

______________________________________________, being first duly sworn, deposes and says that he or she is
of ____________________________________________, the party making the foregoing bid that 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.

I certify (or declare) under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: ____________________  Signature: ____________________

State of California
County of Contra Costa

On ____________________, before me, ____________________, Notary Public, personally appeared

______________________________________________, 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.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing is true and correct.

WITNESS my hand and official seal.

Date: ____________________  Signature: ____________________

[SEAL]

END OF SECTION 00350
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SECTION 00400

STATEMENT OF BIDDER'S QUALIFICATIONS

Contra Costa Community College District (District), in accordance with Public Contract Code Section 20651.5, requires each prospective bidder for a contract, as described under Section 20651, to complete and submit to the District a standardized questionnaire and financial statement in a form specified by the District, including a complete statement of the prospective bidder’s financial ability and experience in performing public works. The questionnaire and financial statement shall be verified under oath by the bidder in the manner in which civil pleadings in civil actions are verified. The questionnaire responses of prospective bidders and their financial statements shall not be deemed public records and shall not be open to public inspection. All information requested must be provided and be current as of the date of the Bid.

I, __________________________________________ being first duly sworn, depose and say:

(Name)

I am the ______________________________________ of __________________________________________

(Title) (Company/Entity)

Firm Name: __________________________________________ Check One:

(as it appears on license)

☐ Corporation
☐ Partnership
☐ Sole Proprietor
☐ Joint Venture

Contact Person: ________________________________

Address: ______________________________________

Phone: __________________ Fax: ______________________

Email: __________________________________________ Tax ID No.: ______________________

If firm is a sole proprietor or partnership:

Owner(s) of Company __________________________________________

Contractor's License Number(s): (California State License Board Classification)

__________________________________________

__________________________________________

__________________________________________

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1

Section 00400 - Page 1 of 10
Statement of Bidder's Qualifications
For Bidders That Are Corporations:

1a. Date incorporated: ________________________________

1b. Under the laws of what state: ____________________________

1c. Provide all the following information for each person who is either (a) an officer of the corporation (president, vice president, secretary, treasurer), or (b) the owner of at least ten per cent of the corporation's stock.

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Years with Company</th>
<th>% Ownership</th>
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</table>

1d. Identify every construction firm that any person listed above has been associated with (as owner, general partner, limited partner or officer) at any time during the last five years.

NOTE: For this question, "owner" and "partner" refer to ownership of ten per cent or more of the business, or 10 per cent or more of its stock, if the business is a corporation.

<table>
<thead>
<tr>
<th>Person's Name</th>
<th>Construction Firm</th>
<th>Dates of Person's Participation with Firm</th>
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</tbody>
</table>
For Bidders That Are Partnerships:

1a. Date of formation: 

1b. Under the laws of what state: 

1c. Provide all the following information for each partner who owns 10 per cent or more of the firm.

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Years with Partnership</th>
<th>% Ownership</th>
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<tbody>
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</table>

1d. Identify every construction company that any partner has been associated with (as owner, general partner, limited partner or officer) at any time during the last five years.

NOTE: For this question, “owner” and “partner” refer to ownership of ten per cent or more of the business, or ten per cent or more of its stock, if the business is a corporation.

<table>
<thead>
<tr>
<th>Person’s Name</th>
<th>Construction Company</th>
<th>Dates of Person’s Participation with Company</th>
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Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
For Bidders That Are Sole Proprietorships:

1a. Date of commencement of business. ________________________________

1b. Tax ID number of company owner ________________________________

1c. Identify every construction firm that the business owner has been associated with (as owner, general partner, limited partner or officer) at any time during the last five years.

NOTE: For this question, "owner" and "partner" refer to ownership of ten per cent or more of the business, or ten per cent or more of its stock, if the business is a corporation.

<table>
<thead>
<tr>
<th>Person’s Name</th>
<th>Construction Company</th>
<th>Dates of Person’s Participation with Company</th>
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</table>

For Bidders That Intend to Make a Bid as Part of a Joint Venture:

1a. Date of commencement of joint venture. ________________________________

1b. Provide all of the following information for each firm that is a member of the joint venture that expects to bid on one or more projects:

<table>
<thead>
<tr>
<th>Name of Firm</th>
<th>% Ownership of Joint Venture</th>
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</tbody>
</table>
For All Bidders

2. Has there been any change in ownership of the firm at any time during the last five years?
   NOTE: A corporation whose shares are publicly traded is not required to answer this question.
   □ Yes    □ No
   If “yes,” explain on a separate signed page (referring to this question).

3. Is the firm a subsidiary, parent, holding company or affiliate of another construction firm?
   NOTE: Include information about other firms if one firm owns 50 percent or more of another, or if an owner, partner, or officer of your firm holds a similar position in another firm.
   □ Yes    □ No
   If “yes,” explain on a separate signed page (referring to this question).

4. Are any corporate officers, partners or owners connected to any other construction firms?
   NOTE: Include information about other firms if an owner, partner, or officer of your firm holds a similar position in another firm.
   □ Yes    □ No
   If “yes,” explain on a separate signed page (referring to this question).

5. List all California construction license numbers, classifications and expiration dates of the California contractor licenses held by your firm:

   ____________________________

   ____________________________
   ____________________________

   If more space is needed add a separate signed page (referring to this question).

6. If any of your firm’s license(s) are held in the name of a corporation or partnership, list below the names of the qualifying individual(s) listed on the CSLB records who meet(s) the experience and examination requirements for each license.

   ____________________________

   ____________________________
   ____________________________

   If more space is needed add a separate signed page (referring to this question).

7. Has your firm changed names or license number in the past five (5) years?
   □ Yes    □ No
   If “yes,” explain on a separate signed page, including the reason for the change, and all former names under which the firm has conducted business.

8. Has any owner, partner or (for corporations) officer of your firm operated another construction firm under any other name in the last five (5) years?
   □ Yes    □ No
   If “yes,” explain on a separate signed page (referring to this question), including the reason for the change.

9. Have you attached your latest copy of a REVIEWED OR AUDITED financial statement with accompanying notes and supplemental information?

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1

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Statement of Bidder's Qualifications
☐ Yes ☐ No

NOTE: A financial statement that is not either reviewed or audited is not acceptable. A letter verifying availability of a line of credit may also be attached; however, it will be considered as supplemental information only, and is not a substitute for the required financial statement.

10. Is the attached Financial Statement for the identical organization of the Bidder?
    ☐ Yes ☐ No
    If "no", explain the relationship and financial responsibility of the organization whose financial statement of provided (i.e., parent/subsidiary, etc.)

    ________________________________
    If more space is needed add a separate signed page (referring to this question).

11. Contractor possesses a VALID AND CURRENT California Contractor's license for the project or projects for which it intends to submit a bid.
    ☐ Yes ☐ No

12. List the categories of work your firm typically performs with its own forces, and check the adjacent boxes of those categories of work that will be self-performed on this project

    ☐ ________________________________ ☐ ________________________________

    ☐ ________________________________ ☐ ________________________________

    ☐ ________________________________ ☐ ________________________________

13. On a separate signed page (referring to this question), list all construction projects your organization has in progress and for each project listed, state; (i) a general description of the work performed or to be performed by your organization; (ii) the owner's name, name of the owner's representative, the owner's address and telephone number; (iii) the project architect, address and telephone number; (iv) percent presently completed and (v) the scheduled completion date.

14. On a separate signed page (referring to this question), list all construction projects completed by your organization in the past three years, and for each project, state; (i) a general description of the work performed by your organization on the project; (ii) the owner's name, name of the owner's representative, the owner's address and telephone number; (iii) the initial and final contract amount; (iv) the initial and final dates of completion; and (v) whether the project was completed within contract time and contract budget.

15. Has a claim or other demand ever been made against your organization's California Contractors License Bond?
    ☐ Yes ☐ No
    If yes, on a separate signed page (referring to this question), state the following: (i) the name, address and telephone number of each person or entity making claim or demand; (ii) the date of each claim or demand; (iii) the circumstances giving rise to each such claim or demand; and (iv) the disposition of each such claim or demand.
16. Has a complaint ever been filed against your organization's California Contractors License with the California Contractors State License Board (CSLB)?
   - [ ] Yes  [ ] No
   If yes, on a separate signed page (referring to this question), state the following for each complaint: (i) the name, address and telephone number of each person or entity making the complaint; (ii) the date of each complaint; (iii) the circumstances giving rise to each such complaint; and (iv) the disposition of each such complaint, including without limitation, any disciplinary or other action imposed or taken by the California Contractors State License Board as a result of any such complaint.

17. Have any lawsuits or other proceedings ever been brought against your organization or any of its principals or officers in connection with any construction contract or construction project?
   - [ ] Yes  [ ] No
   If "yes," on a separate signed page (referring to this question) describe the circumstances, the amount or relief sought and the disposition of each such lawsuit or other proceeding.

18. Has your organization ever filed a lawsuit or initiated other proceedings in connection with any construction contract or construction project?
   - [ ] Yes  [ ] No
   If "yes," on a separate signed page (referring to this question) describe the circumstances, the amount or relief sought and the disposition of each such lawsuit or other proceeding.

19. Are there any judgments, orders or arbitration awards pending, outstanding or by which your organization or any of its officers or principals are bound by?
   - [ ] Yes  [ ] No
   If "yes," on a separate signed page (referring to this question) describe each such judgment, order or arbitration award and the present status of the satisfaction or discharge thereof.

20. Has any California State License Board (CSLB) license held by your firm, or its Responsible Managing Employee (RME) or Responsible Managing Officer (RMO) been suspended or revoked within the last five (5) years?
   - [ ] Yes  [ ] No

21. Has your organization ever failed to complete a construction contract?
   - [ ] Yes  [ ] No
   If "yes," on a separate signed page (referring to this question) state the following; (i) describe each such contract; (ii) the owner's name, address and telephone number; (iii) a description of the project; and (iv) the circumstances of the failure to complete.

22. Has your organization ever been declared in default of a construction contract?
   - [ ] Yes  [ ] No
   If "yes," on a separate signed page (referring to this question) state the following: (i) describe each such contract; (ii) the owner's name, address and telephone number; (iii) a description of the project; and (iv) the circumstances of the declaration of default.

23. Has a claim or other demand ever been asserted against any Bid Bond, Performance Bond or Labor and Material Payment Bond posted by your organization in connection with any construction contract or your submittal of a bid or proposal on a construction contract?
24. At the time of submitting this qualification form, is your firm ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either Labor Code section 1777.1 or Labor Code section 1777.7?
   - [ ] Yes  [ ] No

25. At any time during the last five (5) years, has your firm, or any of its owners, officers, or partners been convicted of a crime involving the awarding of a contract of a government or Public construction project, or the bidding or performance of a government or Public contract?
   - [ ] Yes  [ ] No

26. Has your firm or any of its owners, officers, or partners ever been convicted of a crime involving any federal, state, or local law related to bidding, awarding, or performance of any construction contract?
   - [ ] Yes  [ ] No

27. Has your firm or any of its owners, officers or partners ever been found liable in a civil suit or found guilty in a criminal action for making any false claim or material misrepresentation to any public agency or entity in any way related to any construction contract?
   - [ ] Yes  [ ] No

28. Is your firm CURRENTLY the debtor in a bankruptcy case?
   - [ ] Yes  [ ] No

29. In the last twelve (12) months has your firm, or any firm with which any of your company’s owners, officers or partners was associated, been debarred, disqualified, removed or otherwise prevented from bidding on, or completing, any government agency or public works project for any reason? NOTE: “Associated with” refers to another construction firm in which an owner, partner or officer of your firm held a similar position.
   - [ ] Yes  [ ] No
   If YES, on a separate signed page (referring to this question) state the following: (i) describe each such project; (ii) the owner’s name, address and telephone number; (iii) the circumstances and specific reason given for being prevented from bidding on or completing the project.

30. Has your organization ever refused to sign a contract awarded to it?
   - [ ] Yes  [ ] No
   If YES, on a separate signed page (referring to this question) state the following: (i) describe each such contract; (ii) the owner’s name, address and telephone number; (iii) a description of the project; and (iv) the circumstances of the refusal to sign the contract.

31. In the last twelve (12) months has your firm been denied an award of a public works contract based on a finding by a public agency that your company was NOT a responsible bidder?
   - [ ] Yes  [ ] No
If YES, on a separate signed page (referring to this question) state the following: (i) describe each such contract; (ii) the owner's name, address and telephone number; (iii) a description of the project; and (iv) the circumstances of the determination.

32. Contractor has CURRENT workers' compensation insurance policy as required by the Labor Code or is legally self-insured pursuant to Labor Code section 3700 et. seq.
   □ Yes □ No
   □ Contractor is exempt from this requirement, because it has no employees

33. Within the last two (2) years has there ever been a period when your firm had employees but was without Workers’ Compensation insurance or state-approved self-insurance?
   □ Yes □ No

34. Attach to this statement true and correct copies of the following:

34.1 Your organization's California Contractor's License (the copy must clearly and legibly show: (i) the licensee name; (ii) the expiration date; and (iii) the classification(s) of licensure).

34.2 The Contractor's License Bond posted by your organization in connection with your organization's California Contractor's License pursuant to California Business & Professions Code 7071.5 and 7071.6 (the copy must clearly and legibly show: (i) the Bond number or other information sufficient for identification; (ii) the name, address and telephone number of the Surety on the Bond; (iii) the signature of the individual executing the Bond on behalf of the Surety and if such individual's authority is conferred by a power of attorney or by such individual's authority is conferred by a power of attorney or by such individual's designation as an attorney in fact on behalf of the Surety, include a clear and legible copy of such power of attorney or attorney in fact designation; (iv) the principal on such Bond; and (v) the expiration date of such Bond).

34.3 If your organization's California Contractor's License is issued by virtue of the qualification of a responsible managing employee or responsible managing officer of your organization, the Qualifier's Bond, if required pursuant to California business & Professions Code 7071.9 (the copy must clearly and legibly show: (i) the bond number or other information sufficient for identification; (ii) the name, address and telephone number of the Surety on the Bond; (iii) the signature of the individual executing the Bond on behalf of the Surety and if such individual's authority is conferred by a power of attorney or by such individual's designation as an attorney in fact on behalf of the Surety, include a clear and legible copy of such power of attorney or attorney in fact designation; (iv) the principal on such Bond; and (v) the expiration date of such Bond.)
35. **Certification**

The responses to each and all of the foregoing are complete and accurate; there are no omissions of material fact or information such that would render any of the foregoing false or misleading; there are no misstatements of fact in any of the foregoing.

I, the undersigned, certify and declare that I have read all the foregoing answers to this Section and know their contents. The matters stated in the above answers are true of my own knowledge and belief, except as to those matters stated on information and belief, and as to those matters I believe them to be true. I declare under penalty of perjury under the laws of the State of California, that the foregoing is correct.

Dated: _______________

______________________
(Printed Name)

______________________
(Signature)

NOTARY PUBLIC

==================================================================

ACKNOWLEDGEMENT (By Corporation, Partnership or Individual)

STATE OF CALIFORNIA )
) ss.
COUNTY OF CONTRA COSTA )

On ________________, before me, ____________________________, Notary Public,

personally appeared ____________________________, 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.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing is true and correct.

Witness my hand and official seal.

__________________________________
Notary Public

[SEAL]

==================================================================

END OF SECTION 00400

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1

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Statement of Bidder's Qualifications
SECTION 00450

CERTIFICATION OF SITE VISIT

The Governing Board of the
Contra Costa Community College District
500 Court Street
Martinez, California 94553

Gentlemen/Ladies:

I visited the C-633, Seismic Retrofit, Project 1 job site,

on __________________ at ____________ A.M. P.M (Circle one)

to inspect the proposed work, which would be turned over to me in its present condition, with a representative of the Contra Costa Community College District in order to acquaint myself with the proposed work so that I might fully understand the facilities, difficulties, and restrictions attending the execution of the work under the contract, and acknowledge I had the opportunity to check the Record Drawing as-built drawings and/or previous Contract Documents, site conditions and Bid Documents with the authorized representative of the District.

Owner Representative:

Project Manager – CCCCD Facilities

or

Manager – Buildings & Grounds

Date

Date

Bidder:

Name of Firm or Company

Authorized Signatory

Address

Phone Number

Fax Number

NOTE: Any bidder who fails to return this CERTIFICATION, fully executed, including signature of company representative AND a Contra Costa Community College District representative, with the proposal form, may have their bid rejected as non-responsive.

END OF SECTION 00450
This Page Intentionally Left Blank
PAYMENT BOND
(CALIFORNIA PUBLIC WORK)

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the Contra Costa Community College District (sometimes referred to hereinafter as "Obligee") has awarded to ___________________________________________ (hereinafter designated as the "Principal" or "Contractor"), an agreement for the work described as follows: ___________________________________________, (hereinafter referred to as the "Public Work"); and

WHEREAS, said Contractor is required to furnish a bond in connection with said Contract, and pursuant to California Civil Code Section 9550;

NOW, THEREFORE, We, ___________________________________________, the undersigned Contractor, as Principal; and ___________________________________________ a corporation organized and existing under the laws of the State of ____________________, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the Contra Costa Community College District and to any and all persons, companies, or corporations entitled by law to file stop notices under California Civil Code Section 9100, or any person, company, or corporation entitled to make a claim on this bond, in the sum of ____________ Dollars ($__________), said sum being not less than one hundred percent (100%) of the total amount payable by said Obligee under the terms of said Contract, for which payment will and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, its heirs, executors, administrators, successors, or assigns, or subcontractor, shall fail to pay any person or persons named in Civil Code Section 9100; or fail to pay for any materials, provisions, or other supplies, used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code, with respect to work or labor thereon of any kind; or shall fail to deduct, withhold, and pay over to the Employment Development Department, any amounts required to be deducted, withheld, and paid over by Unemployment Insurance Code Section 13020 with respect to work and labor thereon of any kind, then said Surety will pay for the same, in an amount not exceeding the amount herein above set forth, and in the event suit is brought upon this bond, also will pay such reasonable attorneys’ fees as shall be fixed by the court, awarded and taxed as provided in California Civil Code Sections 9550 et seq.

This bond shall inure to the benefit of any person named in Civil Code Section 9100 giving such person or his/her assigns a right of action in any suit brought upon this bond.

It is further stipulated and agreed that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, or specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described; or pertaining or relating to the furnishing of labor, materials, or equipment therefor; nor by any change or modification of any terms of payment or extension of time for payment pertaining or
relating to any scheme or work of improvement herein above described; nor by any rescission or attempted rescission of the contract, agreement or bond; nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond; nor by any fraud practiced by any person other than the claimant seeking to recover on the bond; and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given; and under no circumstances shall the Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Obligee and the Contractor or on the part of any obligee named in such bond; that the sole condition of recovery shall be that the claimant is a person described in California Civil Code Sections 9100, and who has not been paid the full amount of his or her claim; and that the Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this__________ day of ___________, 20____.

PRINCIPAL/CONTRACTOR:

________________________________________

By: ____________________________________

SURETY:

________________________________________

By: ____________________________________

Attorney-in-Fact

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
IMPORTANT: THIS IS A REQUIRED FORM.

Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in California Insurance Code Section 105, and if the work or project is financed, in whole or in part, with federal, grant or loan funds, Surety's name must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

(Name and Address of Surety)  (Name and Address of agent or representative for service for service of process in California)

Telephone: ____________________________  Telephone: ____________________________

STATE OF CALIFORNIA  )
COUNTY OF  ) ss.

On ______________________ before me, ____________________________, a Notary Public in and for said State, personally appeared ____________________________, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument as the Attorney-in-Fact of the ____________________________ (Surety) and acknowledged to me that he/she/they subscribed the name of the ____________________________ (Surety) thereto and his own name as Attorney-in-Fact on the executed instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

__________________________  (SEAL)

Notary Public in and for said State

Commission expires: ____________________________

NOTE: A copy of the power-of-attorney to local representatives of the bonding company must be attached hereto.
CONTRACT PERFORMANCE BOND
(CALIFORNIA PUBLIC WORK)

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, Contra Costa Community College District (sometimes referred to hereinafter as "Obligee") has awarded to ______________________________ (hereinafter designated as the "Principal" or "Contractor"), an agreement for the work described as follows: ______________________________ (hereinafter referred to as the "Public Work"); and

WHEREAS, the work to be performed by the Contractor is more particularly set forth in that certain contract for said Public Work dated __________ ____________, (hereinafter referred to as the "Contract"), which Contract is incorporated herein by this reference; and

WHEREAS, the Contractor is required by said Contract to perform the terms thereof and to provide a bond both for the performance and guaranty thereof.

NOW, THEREFORE, we, ______________________________, the undersigned Contractor, as Principal, and ______________________________, a corporation organized and existing under the laws of the State of ______________________________, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the Contra Costa Community College District in the sum of ______________________________ Dollars ($______________), said sum being not less than one hundred percent (100%) of the total amount payable by said Obligee under the terms of said Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the bounded Contractor, his or her heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in said Contract and any alteration thereof made as therein provided, on his or her part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill guarantees of all materials and workmanship; and indemnify, defend and save harmless the Obligee, its officers and agents, as stipulated in said Contract, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that it shall not be exonerated or released from the obligation of this bond (either by total exoneration or pro tanto) by any change, extension of time, alteration in or addition to the terms of the contract or to the work to be performed there under or the specifications accompanying the same, nor by any change or modification to any terms of payment or extension of time for any payment pertaining or relating to any scheme of work of improvement under the contract. Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond (either by total exoneration or pro tanto) by any overpayment or underpayment by the Obligee that is based upon estimates.
approved by the Architect. The Surety stipulates and agrees that none of the aforementioned changes, modifications, alterations, additions, extension of time or actions shall in any way affect its obligation on this bond, and it does hereby waive notice of any such changes, modifications, alterations, additions or extension of time to the terms of the contract, or to the work, or the specifications as well notice of any other actions that result in the foregoing.

Whenever Principal shall be, and is declared by the Obligee to be, in default under the Contract, the Surety shall promptly either remedy the default, or shall promptly complete the Contract through its agents or independent contractors, subject to acceptance and approval of such agents or independent contractors by Obligee as hereinafter set forth, in accordance with its terms and conditions and to pay and perform all obligations of Principal under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages; or, at Obligee’s sole discretion and election, Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Obligee of the lowest responsible bidder, arrange for a contract between such bidder and the Obligee and make available as Work progresses (even though there should be a default or succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the “balance of the Contract price” (as hereinafter defined), and to pay and perform all obligations of Principal under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term “balance of the Contract price,” as used in this paragraph, shall mean the total amount payable to Principal by the Obligee under the Contract and any modifications thereto, less the amount previously paid by the Obligee to the Principal, less any withholdings by the Obligee allowed under the Contract.

Surety expressly agrees that the Obligee may reject any agent or contractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal. Unless otherwise agreed by Obligee, in its sole discretion, Surety shall not utilize Principal in completing the Contract nor shall Surety accept a bid from Principal for completion of the work in the event of default by the Principal.

No final settlement between the Obligee and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

The Contractor and Surety shall remain responsible and liable for all patent and latent defects that arise out of or are related to the Contractor’s failure and/or inability to properly complete the Public Work as required by the Contract and the Contract Documents. The obligation of the Surety hereunder shall continue so long as any obligation of the Contractor remains.

Contractor and Surety agree that if the Obligee is required to engage the services of an attorney in connection with enforcement of the bond, Contractor and Surety shall pay Obligee’s reasonable attorneys’ fees incurred, with or without suit, in addition to the above sum.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including reasonable attorneys’ fees to be fixed by the Court.
IN WITNESS WHEREOF, we have hereunto set our hands and seals this ____ day of 
____________________, 20____.

PRINCIPAL/CONTRACTOR:

____________________

By: ____________________

SURETY:

____________________

By: ____________________

Attorney-in-Fact

The rate of premium on this bond is __________________________ per thousand.

The total amount of premium charged: $________________________ (This must be filled in by a corporate surety).

IMPORTANT: THIS IS A REQUIRED FORM.

Surety companies executing bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in California Insurance Code Section 105, and if the work or project is financed, in whole or in part, with federal, grant or loan funds, Surety’s name must also appear on the Treasury Department’s most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

(Name and Address of Surety) (Name and Address of agent or representative for service for service of process in California)

__________________________________  ____________________________________

__________________________________  ____________________________________

Telephone: ________________________  Telephone: ________________________

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
STATE OF CALIFORNIA

COUNTY OF

On ______________ before me, ___________________________ (insert name and title of the officer)

On ____________________, before me, ___________________________ a Notary

Public in and for said State, personally appeared ___________________________, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument as the Attorney-in-Fact of the ___________________________ (Surety) and acknowledged to me that he/she/they subscribed the name of the ___________________________ (Surety) thereto and his own name as Attorney-in-Fact on the executed instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

______________________________
(SEAL)

Notary Public in and for said State

Commission expires: ________________

NOTE: A copy of the power-of-attorney to local representatives of the bonding company must be attached hereto.
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SECTION 00510

NOTICE OF AWARD

DATE: ____________________________

TO: ____________________________________

ADDRESS: ________________________________

PROJECT: ________________________________

The Contract Sum of your contract is ________________________________ Dollars, ($___________).

You must comply with the following conditions within ten (10) calendar days of the date of this Notice of Award, that is, by ________________.

1. You must deliver to the District two fully executed counterparts of Section 00600, “Construction Agreement.”

2. You must deliver to the District the “Contract Performance Bond,” and “Payment Bond,” executed by you and your surety, which are included in Section 00500.

3. You must deliver to District the insurance certificates required in Section 00700, for insurance required in Section 00600, Construction Agreement.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited. Within ten (10) calendar days after you comply with these conditions, the District will return to you one fully signed counterpart of the Construction Agreement.

Contra Costa Community College District

By: ____________________________________

Title: __________________________________

END OF DOCUMENT
SECTION 00600

CONSTRUCTION AGREEMENT

CONTRACT NO. __________________________
(Construction Agreement)

This Agreement shall not be enforceable until ratified and approved by the Contra Costa Community College District’s Governing Board. The estimated board meeting date is May 28, 2014.

(Public Agency) CONTRA COSTA COMMUNITY COLLEGE DISTRICT
500 Court St, Martinez, CA 94553

Contractor Address:


(S1.2) Effective Date: May 29, 2014

(S1.3) The Work: C-633, Seismic Retrofit, Project 1

(S1.4) Completion Time: 71 Calendar Days from the Notice to Proceed to Substantial Completion, and 45 Calendar Days from Substantial Completion to Final Completion (Remaining Work).

(S1.5.1) Liquidated Damages, Substantial Completion: $3,000 per Calendar Day beyond the Contract Substantial Completion Date.

(S1.5.2) Liquidated Damages, Remaining Work/Final Completion: $500/ per calendar day Remaining Work is delayed beyond the Contract Final Completion Date.

(S1.6) Public Agency’s Agent: CONTRA COSTA COMMUNITY COLLEGE DISTRICT ("District")

(S1.7) Contract Sum: MILLION THOUSAND, HUNDRED DOLLARS and NO CENTS ($000,000,000.00)

2. SCOPE OF WORK:

The Scope of Work consists of general construction to seismically retrofit multiple buildings located on Campus. Other Work includes, but is not limited to, abatement, temporary construction, demolition, structural, electrical, mechanical, signage and architectural finishes.

3. WORK CONTRACT, CHANGES

(a) By their signatures below, effective on the above date, these parties promise and agree as set forth in this Agreement, incorporating by these references labor and materials contained in Section 2, Scope of Work.
(b) Contractor shall, at Contractor's own cost and expense, and in a workmanlike manner, fully and faithfully perform and complete the work; and will furnish all materials, labor, services, equipment, and transportation necessary, convenient and proper in order fairly to perform the requirements of this contract, all strictly in accordance with the Public Agency's drawings and specifications.

(c) The work can be changed only with Public Agency's prior written order specifying such change and its cost agreed to by the parties; and the Public Agency shall never have to pay more than specified in Section 1.7 without such an order.

4. **TIME: NOTICE TO PROCEED AND ACCEPTANCE**

(a) Contractor shall start this work as directed in the specifications or the Notice to Proceed and shall complete it as specified in Section 1, Completion Time.

(b) Remaining Work after Substantial Completion. If the Architect or District determines that the work required by the Contract is Substantially Complete during any inspection conducted pursuant to this Agreement or Specification Section 01770, Contract Closeout Procedures, the Contractor shall be notified of that determination and the District shall determine if there is Remaining Work. A list of Remaining Work shall be issued only by the District or the Architect and only after the District has certified Substantial Completion. The District or Architect shall give the Contractor the necessary instructions for correction or completion of the Remaining Work, and the Contractor shall immediately comply with and execute such instructions within the Contract Time. Upon completion of the Remaining Work, another inspection shall be made that shall constitute the Final Inspection, provided the Remaining Work has been completed to the satisfaction of the District. If the remaining work has been completed to the satisfaction of the District, the District shall make the final acceptance and notify the Contractor in writing of this acceptance as of the date of Final Inspection.

(c) Final Acceptance – Upon due notice from the Contractor of completion of the entire project, the District shall make an inspection. If all construction provided for and contemplated by the contract is found to be completed to the District's satisfaction then that inspection shall constitute the Final Inspection and the District shall notify the Contractor in writing of final acceptance effective as of the date of the Final Inspection.

(d) Default for failure to Complete Remaining Work In the event the Contract Time expires before the Remaining Work is completed to the satisfaction of the District, the District may provide notice to the Contractor that the Remaining Work shall be completed by Contractor to the satisfaction of the District within ten consecutive calendar days from the date of such notice. The failure of the Contractor to satisfactorily complete the Remaining Work within the ten days shall entitle to District to declare Contractor in default and thereafter terminate the Contract. The ten-day notice provided under this paragraph shall not be construed as adding any time to the Contract Time and is a time period solely for the purposes of providing notice of default.

(e) Application for Final Payment. After the Contractor has completed all Remaining Work to the satisfaction of the District and delivered all maintenance and operating instructions, schedules, guarantees, warranties, bonds, certificates of inspection, marked-up record documents and other documents as required by the Contract, and after the District or Architect has indicated that the work is acceptable, Contractor may make application for final payment following the Payments Procedures for progress payments. The final application for payment shall be accompanied by all documentation called for in the Contract Documents, together with
complete and legally effective releases or waivers (satisfactory to the District) of all liens arising out of or filed in connection with the work on the project.

(f) Final Payment and Acceptance. If the Architect determines that the work has been completed and the Contractor's other obligations under the Contract have been fulfilled, the Architect shall, within ten working days after receipt of the final application for payment, indicate in writing the Architect's recommendation of payment and present the application to District for payment. Thereupon the Architect shall prepare a Certificate of Final Completion. Otherwise, Architect shall return the application to Contractor indicating in writing the reasons for refusing to recommend final payment. Contractor shall make the corrections identified in the Architect's refusal to recommend final payment. Thirty days after presentation to District of the application and accompanying documentation, with the Architect's recommendation and notice of acceptability of the work, the amount recommended by Architect shall be due and payable by District to Contractor.

5. LIQUIDATED DAMAGES

5.1 LIQUIDATED DAMAGES - SUBSTANTIAL COMPLETION

If the Contractor fails to complete this contract and this Work within the time fixed therefore, allowance being made for contingencies as provided herein, Contractor becomes liable to the Public Agency for all its loss and damage therefrom; and because, from the nature of the case, it is and will be impracticable and extremely difficult to ascertain and fix the Public Agency's actual damage from any delay in performance hereof, it is agreed that Contractor will pay as liquidated damages to the Public Agency the reasonable sum specified in Section 1, the result of the parties' reasonable endeavor to estimate fair average compensation therefore, for each calendar day's delay in finishing said Work; and if the same be not paid, Public Agency may, in addition to its other remedies, deduct the same from any money due or to become due Contractor under this Contract. If the Public Agency for any cause authorizes or contributes to a delay, suspension of work or extension of time, its duration shall be added to the time allowed for completion, but it shall not be deemed a waiver nor be used to defeat any right of the Agency to damages for non-completion or delay hereunder. Pursuant to Government Code Section 4215, the Contractor shall not be assessed liquidated damages for delay in completion of the work, when such delay was caused by the failure of the Public Agency or the owner of a utility to provide for removal or relocation of existing utility facilities.

5.2 LIQUIDATED DAMAGES - THE REMAINING WORK

The Remaining Work, as such work is determined by the Public Agency or Public Agency's Representative, shall be completed within the Contract Time or any proper extension thereof granted by Public Agency. If the Contractor shall neglect, fail or refuse to complete the Remaining Work within the Contract Time or any proper extension thereof granted by the Public Agency, then the Contractor does hereby agree, as part consideration for the awarding of this Contract, to pay to the Public Agency the amount specified in the Contract, not as a penalty but as liquidated damages for the Remaining Work for each such breach of Contract set forth herein for each and every consecutive calendar day that the Contractor shall be in default after expiration of the Contract Time.
6. **INTEGRATED DOCUMENTS**

The drawings and specifications and special provisions of the Public Agency’s Notice Inviting Bids, and Contractor’s accepted bid for this work are hereby incorporated into this Contract; and they are intended to cooperate, so that anything exhibited in the drawings and not mentioned in the specifications or special provisions, or vice versa, is to be executed as if exhibited, mentioned and set forth in both, to the true intent and meaning thereof when taken all together; and differences of opinion concerning these shall be finally determined by the Public Agency.

7. **PAYMENT**

(a) For strict and literal fulfillment of these promises and conditions, and full compensation for all this work, the Public Agency shall pay the Contractor the sum specified in Section 1, except that in unit price contracts the payment shall be for finished quantities at unit bid prices.

(b) On or about the first day of each calendar month, the Contractor shall submit to the Public Agency a verified application for payment, supported by a statement showing all materials actually installed during the preceding month, the labor expended thereon, and the cost thereof; whereupon, after checking, the Public Agency shall issue to Contractor a certificate for the amount determined to be due, minus five (5%) percent thereof pursuant to the Public Agency’s General Terms and Conditions, but not until defective work and materials have been removed, replaced and made good.

8. **PAYMENTS WITHHELD**

(a) The Public Agency or its agent may withhold any payment, or because of later discovered evidence nullify all or any certificate for payment, to such extent and period of time only as may be necessary to protect the Public Agency from loss because of:

1. Defective work not remedied, or work not completed, or
2. Claims filed or reasonable evidence indicating probable filing, or
3. Failure to properly pay subcontractors or for material or labor, or
4. Reasonable doubt that the work can be completed for the balance then unpaid, or
5. Damage to another contractor, or
6. Damage to the Public Agency, other than damage due to delays.

(b) The Public Agency shall use reasonable diligence to discover and report to the Contractor, as the work progresses, the materials and labor which are not satisfactory to it, so as to avoid unnecessary trouble or cost to the Contractor in making good any defective work or parts.

(c) Thirty-five (35) calendar days after Public Agency files its notice of completion of the entire work, it shall issue a certificate to the Contractor and pay the balance of the contract sum after deducting all amounts withheld under this contract, provided the Contractor shows that all claims for labor and materials have been paid, no claims have been presented to the Public Agency based on acts or omissions of the Contractor, and no liens or withhold notices have been filed against the work or site, and provided there are not reasonable indications of defective or missing work or of late-recorded notices of liens or claims against Contractor.
9. **INSURANCE**

**Contractor's Liability Insurance:** Before the commencement of the Work, the Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in California as admitted carriers with a financial rating of at least A status as rated in the most recent edition of Best's Insurance Reports or as amended by the Supplementary General Conditions, if any, such insurance as will protect the Public Agency from claims set forth below, which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations are by the Contractor, by a Subcontractor, by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

(a) Claims for damages because of bodily injury, sickness, disease, or death of any person District would require indemnification and coverage for employee claim;

(b) Claims for damages insured by usual personal injury liability coverage, which are sustained by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor or by another person;

(c) Claims for damages because of injury or destruction of tangible property, including loss of use resulting therefrom, arising from operations under the Contract Documents;

(d) Claims for damages because of bodily injury, death of a person, or property damage arising out of the ownership, maintenance, or use of a motor vehicle, all mobile equipment, and vehicles moving under their own power and engaged in the Work;

(e) Claims involving contractual liability applicable to the Contractor's obligations under the Contract Documents, including liability assumed by and the indemnity and defense obligations of the Contractor and the Subcontractors; and

(f) Claims involving Completed Operations, Independent Contractors' coverage, and Broad Form property damage, without any exclusions for collapse, explosion, demolition, underground coverage, and excavating. (XCU)

(g) Claims involving sudden or accidental discharge of contaminants or pollutants.

**Subcontractor Insurance Requirements:** The Contractor shall require its Subcontractors to take out and maintain similar public liability insurance and property damage insurance as required under the above paragraph, titled “Contractor's Liability Insurance, in amounts commensurate with the value of the subcontract. A “claims made” or modified “occurrence” policy shall not satisfy the requirements of the above paragraph, titled “Contractor's Liability Insurance, without prior written approval of the District.

**Additional Insured Endorsement Requirement:** The Contractor shall name, on any policy of insurance, the District, Architect, Inspector, the State of California, their officers, employees, agents and independent contractors as Additional Insured. Subcontractors shall name the Contractor, the District, Architect, Inspector, the State of California, their officers, employees, agents and independent contractors as Additional Insured.

The Additional Insured Endorsement included on all such insurance policies shall state that coverage is afforded the additional insured with respect to claims arising out of operations performed by or on behalf of the insured. If the Additional Insured have other insurance which is applicable to the loss, such other insurance shall be on an excess or contingent basis. The insurance provided by the
Contractor must be designated in the policy as primary to any insurance obtained by the Public Agency. The amount of the insurer’s liability shall not be reduced by the existence of such other insurance.

**Workers’ Compensation Insurance:** During the term of this Contract, the Contractor shall provide workers’ compensation insurance for all of the Contractor’s employees engaged in Work under this Contract on or at the Site of the Project and, in case any of the Contractor’s Work is subcontracted, the Contractor shall require the Subcontractor to provide workers’ compensation insurance for all the Subcontractor’s employees engaged in Work under the subcontract. Any class of employee or employees not covered by a Subcontractor’s insurance shall be covered by the Contractor’s insurance. In case any class of employees engaged in Work under this Contract on or at the Site of the Project is not protected under the Workers’ Compensation laws, the Contractor shall provide or cause a Subcontractor to provide adequate insurance coverage for the protection of those employees not otherwise protected. The Contractor shall file with the District certificates of insurance as required under Section 00700, Article 11.6, and in compliance with Labor Code § 3700.

**Specific Insurance Requirement:** Contractor shall take out and maintain and shall require all subcontractors, if any, whether primary or secondary, to take out and maintain:

(a)  **Workers’ Compensation Insurance:** $1,000,000.00; Contractor is aware of and complies with Labor Code Section 3700 and the Worker’s Compensation Law.

(b)  **Comprehensive General Liability Insurance** with a combined single limit per occurrence of not less than $1,000,000.00 and $2,000,000.00 project specific aggregate, or Commercial General Liability Insurance (including automobile insurance) which provides limits of not less than:

1. Per occurrence (combined single limit) $1,000,000.00
2. Project Specific Aggregate (for this project only) $2,000,000.00
3. Products and Completed Operations $1,000,000.00

(c)  **Insurance Covering Special Hazards**

The following Special hazards shall be covered by riders or riders to above mentioned public liability insurance or property damage insurance policy or policies of insurance, in amounts as follows:

1. Automotive and truck where operated in amounts $1,000,000.00
2. Material Hoist where used in amounts $1,000,000.00
3. Explosion, Collapse and Underground (XCU coverage) $1,000,000.00

(d)  In addition, provide Excess Liability Insurance coverage in the amount of Two Million Dollars ($2,000,000.00).

**Builder’s Risk/ “All Risk” Insurance/ Course-of-Construction Insurance Requirements:** The Contractor, during the progress of the Work and until final acceptance of the Work by District upon completion of the entire Contract, shall maintain Builder’s Risk, Course of Construction or similar first party property coverage issued on a replacement cost value basis consistent with the total replacement cost of all insurable Work and the Project included within the Contract Documents. Coverage is to insure against all risks of accidental direct physical loss, and must include, by the basic grant of coverage or by endorsement, the perils of vandalism, malicious mischief (both without any limitation regarding vacancy or occupancy), fire, sprinkler leakage, civil authority, sonic boom, earthquake, flood, collapse,
wind, lightning, smoke and riot. The coverage must include debris removal, demolition, increased costs
due to enforcement of building ordinance and law in the repair and replacement of damage and
undamaged portions of the property, and reasonable costs for the Architect’s and engineering services
and expenses required as a result of any insured loss upon the Work and Project which is the subject
of the Contract Documents, including completed Work and Work in progress, to the full insurable value
thereof. Such insurance shall include the District and the Architect as additional named insureds, and
any other person with an insurable interest as designated by the District.

The Contractor shall submit to the District for its approval all items deemed to be uninsurable. The risk
of the damage to the Work due to the perils covered by the “Builder’s Risk/All Risk” Insurance, as well
as any other hazard which might result in damage to the Work, is that of the Contractor and the surety,
and no claims for such loss or damage shall be recognized by the District nor will such loss or damage
excuse the complete and satisfactory performance of the Contract by the Contractor.

10. BONDS

Bond Requirements: Prior to commencing any portion of the Work, the Contractor shall furnish
separate payment and performance bonds for its portion of the Work which shall cover 100% faithful
performance of and payment of all obligations arising under the Contract Documents and/or
guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work.
All bonds shall be provided by a corporate surety authorized and admitted to transact business in
California as sureties.

To the extent, if any, that the Contract Sum is increased in accordance with the Contract Documents,
the Contractor shall, upon request of the Public Agency, cause the amount of the bonds to be increased
accordingly and shall promptly deliver satisfactory evidence of such increase to the Public Agency. To
the extent available, the bonds shall further provide that no change or alteration of the Contract
Documents (including, without limitation, an increase in the Contract Sum, as referred to above),
extensions of time, or modifications of the time, terms, or conditions of payment to the Contractor will
release the surety. If the Contractor fails to furnish the required bonds, the Public Agency may
terminate the Contract for cause.

On signing this contract, Contractor shall deliver to Public Agency for approval good and sufficient
bonds with sureties, in amount(s), specified in the specifications or special provisions, guaranteeing
faithful performance of this contract and payment for all labor and materials hereunder.

Surety Qualifications: Only bonds executed by admitted Surety insurers as defined in Code of Civil
Procedure § 995.120 shall be accepted. Surety must be a California-admitted surety and listed by the
U.S. Treasury with a bonding capacity in excess of the Project cost.

Alternate Surety Qualifications: If a California-admitted surety insurer issuing bonds does not meet
these requirements, the insurer will be considered qualified if it is in conformance with § 995.660 of the
California Code of Civil Procedure and proof of such is provided to the District.

11. FAILURE TO PERFORM

If the Contractor at any time refuses or neglects, without fault of the Public Agency or its agent(s), to
supply sufficient materials or workers to complete this agreement and work as provided herein, for a
period of ten days or more after written notice thereof by the Public Agency, the Public Agency may furnish same and deduct the reasonable expenses thereof from the contract price.

12. LAWS APPLY: General

Both parties recognize the applicability of various federal, state and local laws and regulations, especially Chapter 1 of Part 7 of the California Labor Code (beginning with Section 1720, and including Sections 1735, 1777.5, 1777.6, forbidding discrimination) and intend that this agreement complies therewith. The parties specifically stipulate that the relevant penalties and forfeitures provided in the Labor Code, especially in Sections 1775, 1776, and 1813, concerning prevailing wages and hours, shall apply to this agreement as though fully stipulated herein.

13. SUBCONTRACTORS

Public Contract Code Sections 4100-4113 are incorporated herein.

14. WAGE RATES

(a) Pursuant to Labor Code Section 1773, the Director of the Department of Industrial Relations has ascertained the general prevailing rates of wages per diem, and for holiday and overtime work, in the locality in which this work is to be performed, for each craft, specified in the call for bids for this work and are on file with the Public Agency, and are hereby incorporated herein.

(b) This schedule of wages is based on a working day of eight (8) hours unless otherwise specified; and the daily rate is the hourly rate multiplied by the number of hours constituting the working day. When less than that number of hours are worked, the daily wage rate is proportionately reduced, but the hourly rate remains as stated.

(c) The Contractor, and all subcontractors, must pay at least these rates to all persons on this work, including all travel, subsistence, and fringe benefit payments provided for by applicable collective bargaining agreements. All skilled labor not listed above must be paid at least the wage scale established by collective bargaining agreement for such labor in the locality where such work is being performed. If it becomes necessary for the Contractor or any subcontractor to employ any person in a craft, classification or type of work (except executive, supervisory, administrative, clerical or other non-manual workers as such) for which no minimum wage rate is specified, the contractor shall immediately notify the Public Agency which shall promptly determine the prevailing wage rate therefore and furnish the Contractor with the minimum rate based thereon, which shall apply from the time of the initial employment of the person affected and during the continuance of such employment.

15. HOURS OF LABOR

Eight hours of labor in one calendar day constitutes a legal day's work, and no worker employed at any time on this work by the Contractor or by any subcontractor shall be required or permitted to work longer thereon except as provided in Labor Code Sections 1810-1815.
16. APPRENTICES

Properly indentured apprentices may be employed on this work in accordance with Labor Code Sections 1777.5 and 1777.6, forbidding discrimination.

17. PREFERENCE FOR MATERIALS

The Public Agency desires to promote the industries and economy of Contra Costa County, and the Contractor therefore promises to use the products, workers, laborers and mechanics of this County in every case where the price, fitness and quality are at least equal.

18. ASSIGNMENT

This agreement binds the heirs, successors, assigns, and representatives of the Contractor; but Contractor cannot assign it in whole or in part, nor any monies due or to become due under it, without the prior written consent of the Public Agency and the Contractor's surety or sureties, unless they have waived notice of assignment.

19. NO WAIVER BY PUBLIC AGENCY

Inspection of the work and/or materials, or approval of work and/or materials inspected, or statement by any officer, agent or employee of the Public Agency indicating the work or any part thereof complies with the requirements of this contract, or acceptance of the whole or any part of said work and/or materials, or payments therefore, or any combination of these acts, shall not relieve the Contractor of Contractor's obligation to fulfill this contract as prescribed; nor shall the Public Agency thereby stopped from bringing any action for damages or enforcement arising from the failure to comply with any of the terms and conditions hereof.

20. HOLD HARMLESS AND INDEMNITY

(a) Contractor promises to and shall hold harmless and indemnify from the liabilities as defined in this section.

(b) The indemnities benefited and protected by this promise are the Public Agency and its elective and appointive boards, commissions, officers, agents and employees.

(c) The liabilities protected against are any liability or claim for damage of any kind allegedly suffered, incurred or threatened because of actions defined below, including personal injury, death, property damage, inverse condemnation, or any combination of these, regardless of whether or not such liability, claim or damage was foreseeable at any time before the Public Agency approved the improvement plan or accepted the improvements as completed, and including the defense of any suit(s) or action(s) at law or equity concerning these.

(d) The actions causing liability are any act or omission (negligent or non-negligent) in connection with the matters covered by this contract and attributable to the contractor, subcontractor(s), or any officer(s), agent(s), or employee(s) of one or more of them.

(e) Non-conditions: The promise and agreement in this section is not conditioned or dependent on whether or not any Indemnities has prepared, supplied, or approved any plan(s), drawing(s),
specifications(s) or special provision(s) in connection with this work, has insurance or other indemnification covering any of these matters, or that the alleged damage resulted partly from any negligent or willful misconduct of any Indemnities.

21. **EXCAVATION**

Contractor shall comply with the provisions of Labor Code Section 6705, if applicable, by submitting to Public Agency 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 trench excavation.

22. **GOVERNMENT CODE SECTION 10532**

Contractor shall be subject to the examination and audit of the Auditor General for a period of three years after final payment under the contract.

23. **WARRANTY**

(a) In addition to any other warranties or guaranties in the Contract Documents, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the Work or Phase of Work, unless otherwise provided or extended in the Contract Documents. If the District takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the District takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to District-owned or controlled real or personal property, when that damage is the result of—

(1) The Contractor's failure to conform to contract requirements; or
(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year or as otherwise provided or extended from the date of repair or replacement.

(e) The District shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the District shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall—

(1) Obtain all warranties that would be given in normal commercial practice;
(2) Require all warranties to be executed, in writing, for the benefit of the District, if directed by the District; and

(3) Enforce all warranties for the benefit of the District, if directed by the District.

(h) In the event the Contractor’s warranty under paragraph (b) of this clause has expired, the District may bring suit at its expense to enforce a subcontractor’s, manufacturer’s, or supplier’s warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the District nor for the repair of any damage that results from any defect in District-furnished material or design.

(j) This warranty shall not limit the District’s rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

24. CONSEQUENTIAL DAMAGES

The Contractor and Public Agency waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

(a) Damages incurred by the Public Agency for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

(b) Damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination. Nothing contained in this subparagraph shall be deemed to preclude an award of liquidated direct damages, when applicable, in accordance with the requirements of the Contract Documents.

25. HAZARDOUS MATERIALS

(a) If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos, lead or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Public Agency in writing.

(b) The Public Agency shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. The Public Agency shall furnish in writing to the Contractor the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written
notification from the Public Agency and Contractor. The Contract Time shall be extended appropriately.

26. SAFETY

(a) **Safety Programs.** In addition to and as required by other Sections of the Contract Documents, the Contractor shall be solely responsible for initiating, maintaining and supervising all safety programs required by applicable law, ordinance, regulation or governmental orders in connection with the performance of the Contract, or otherwise required by the type or nature of the Work. The Contractor’s safety program shall include all actions and programs necessary for compliance with California or federally statutorily mandated workplace safety programs, including without limitation, compliance with the California Drug Free Workplace Act of 1990 (California Government Code §§8350 et seq.). Without limiting or relieving the Contractor of its obligations hereunder, the Contractor shall require that its Subcontractors similarly initiate and maintain all appropriate or required safety programs. Prior to commencement of Work, the Contractor shall meet with the Campus Buildings and Grounds Manager, Project Manager, and Construction Manager to review Contractor’s safety precautions and implementation of safety programs during the Work.

(b) **Safety Precautions.** In addition to and as required by other Sections of the Contract Documents, the Contractor shall be solely responsible for initiating and maintaining reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to: (i) employees on the Work and other persons who may be affected thereby; (ii) the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor’s Subcontractors or Sub-subcontractors; and (iii) other property or items at the site of the Work, or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction. The Contractor shall take adequate precautions and measures to protect existing roads, sidewalks, curbs, pavement, utilities, adjoining property and improvements thereon (including without limitation, protection from settlement or loss of lateral support) and to avoid damage thereto. Without adjustment of the Contract Price or the Contract Time, the Contractor shall repair, replace or restore any damage or destruction of the foregoing items as a result of performance or installation of the Work.

(c) **Safety Signs, Barricades.** In addition to and as required by other Sections of the Contract Documents, the Contractor shall erect and maintain, as required by existing conditions and conditions resulting from performance of the Contract, reasonable safeguards for safety and protection of property and persons, including, without limitation, posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Districts and users of adjacent sites and utilities.

(d) **Safety Notices.** In addition to and as required by other Sections of the Contract Documents, the Contractor shall give or post all notices required by applicable law and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
27. SIGNATURES AND ACKNOWLEDGEMENT

Public Agency, By: _____________________________________________

David Wetmore, Director of Purchasing and Contracts

Note to Contractor: (1) Execute acknowledgement form below, and (2) if a corporation, affix Corporate Seal.

Contractor hereby also acknowledging awareness of and compliance with Labor Code S1861 concerning Worker's Compensation Law.

Contractor:

By: __________________________ (CORPORATE SEAL)

(Designate Official Capacity – COMPANY NAME)

____________________________________________________

Print NAME and TITLE

______________________  _______________________

License Number  Federal ID Number

----------------------------------------------------------------------------------

NOTARY PUBLIC


State of California )ss.

Individual)

County of Contra Costa )

ACKNOWLEDGEMENT (By Corporation, Partnership or Individual)

The person(s) signing above for Contractor, known to me in individual and business capacity as stated, personally appeared before me today and acknowledged that he/she/they executed it and that the corporation or partnership named above executed it.

Dated: ____________________________

(NOTARIAL SEAL)

END OF SECTION 00600

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1

Section 00600 - Page 13 of 13
Construction Agreement
SECTION 00650
NOTICE TO PROCEED

Date: __________________________

TO: __________________________________________________________

ADDRESS: ______________________________________________________

PROJECT: ______________________________________________________

You are notified that the Contract Time under the above contract will commence to run on ___________. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Section 00600, Construction Agreement, the date of Substantial Completion is ________________, and the date for Final Completion is ________________.

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

By: _______________________________________
Ray Pyle

Title: Chief Facilities Planner

END OF DOCUMENT
# SECTION 00700
## GENERAL CONDITIONS

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ARTICLE 1

GENERAL CONDITIONS

1.1 BASIC DEFINITIONS

1.1.1 Action of the Governing Board is a vote of a majority of the District’s governing board.

1.1.2 Approval for a Contract, Agreement, or Change Order means written authorization through action of the governing board unless specific delegation of approval authority is delegated to a District representative.

1.1.3 Approved. The term “approved,” when used to convey Architect’s action on Contractor’s submittals, applications, and requests, is limited to Architect’s duties and responsibilities as stated in the Conditions of the Contract.

1.1.4 Architect means the architect, engineer, or other design professional engaged by the District to design and perform general observation of the work of construction and interpret the drawings and specifications for the Project.

1.1.5 As shown, as indicated, as detailed refer to drawings accompanying this specification.

1.1.6 Bid/Bidders. The term Bid and Proposal have the same meaning, and the same is true for Bidders and Proposers.

1.1.7 Contract or Agreement. When the terms are used in these General Conditions shall be references to the Contract Documents as defined herein.

1.1.8 Contract Time. Contract Time means the number of consecutive calendar days specified in the contract immediately after the date to commence work issued by Owner in the Notice to Proceed and includes both the time allowed for completion of the work required to achieve Substantial Completion and the time allowed to complete the Remaining Work.

1.1.9 Contractor. Whenever the term “Contractor” is used in the Contract or elsewhere in the Contract Documents, it refers to a person or entity that has an agreement directly with the District to perform any of the work for the Project. The term Contractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Contractor or his authorized representative. The term Contractor does not include any contractors under separate and direct contract with the District. A Subcontractor is a person or entity that has a direct or indirect contract with the Contractor to perform any of the Work at the site.

1.1.10 Contractor’s Construction Schedule. The document prepared by the Contractor, which details the events of construction and establishes completion dates for the various stages of the Work and the entire project.

1.1.11 The Contract Documents. The Contract Documents consist of the Agreement between District and Contractor (hereinafter the Agreement or Contract), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, addenda issued prior to bid, instructions to bidders, notice to bidders, and the requirements contained in the Bid Documents, other documents
listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is a written amendment to the Contract signed by parties, a Change Order, a Construction Change Directive, or a written order for a minor change in the Work issued by the Architect. The Contract Documents collectively form the Contract. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a written Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Architect and Contractor, between the District and any Subcontractor or Sub-subcontractor, or between any persons or entities other than the District and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect’s duties.

1.1.12 Contractor, District, and Architect are those mentioned as such in the Agreement. They are treated throughout the Contract Documents as if they are of singular number and neuter gender. Any reference to “Owner” shall mean “District.”

1.1.13 Construction Manager. Whenever the term “Construction Manager” or “CM” is used in the contract or elsewhere in the Contract Documents, it refers to the District assigned Construction Manager, or the District Project Manager if no CM is assigned.

1.1.14 Days means calendar days, unless otherwise noted as working days.

1.1.15 Directed. Terms such as “directed,” “requested,” “authorized,” “selected,” “approved,” “required,” and “permitted” mean directed by the Architect or the District, requested by the Architect or District, and similar phrases.

1.1.16 District. Whenever the term “District” is used in the Contract Documents, it refers to the Contra Costa Community College District or those persons designated by the District to act in/on its behalf.

1.1.17 The Drawings are graphic and pictorial portions of the Contract Documents prepared for the Project and approved changes thereto, wherever located and whenever issued, showing the design, location, and scope of the Work, generally including plans, elevations, sections, details, schedules, and diagrams as drawn or approved by the Architect.

1.1.18 Emergency shall be defined as a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. Emergency includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.

1.1.19 Exposed. Whenever this term is used it shall be understood to mean any item or surface, exterior, or interior, which can be seen by a person outside the building, or seen by a person inside any usable space within the building during normal activity. Mechanical and electrical rooms, utility and service tunnels, air handling rooms, and penthouses or platforms shall be considered to have exposed surfaces, as shall the mechanical and electrical construction within them. The interior of closets and alcoves shall be considered exposed surfaces, and shall be finished to match the finish of the adjoining room or space, unless another finish is shown. The interiors of cabinets shall be considered exposed, but a finish different from that of the exterior may be permitted or specified. Spaces which are not normally occupied or used by occupants or building staff, such as shafts, hoistways, ceiling plenums,
attics and crawl spaces shall be considered “concealed” spaces, unless finishes are shown or specified for their surfaces.

1.1.20 Final Completion. The date when all Work for the total project has been completed in accordance with the terms of the Contract Documents and has been inspected following completion of Work identified in the Punchlist Inspection and accepted by the Architect and the District.

1.1.21 Furnish. Whenever this term is used it shall be understood to mean “purchase and deliver to the project site” ready for unloading, unpacking, assembly, installation, and similar operations.

1.1.22 Governing Dictionary. The definitions of words used in these Specifications, which are not defined, The General Conditions, or in referenced standards, are as given in “The American Heritage Dictionary of the English Language”.

1.1.23 Indicated. The term “indicated” refers to graphic representations, notes, or schedules on Drawings or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as “shown,” “noted,” “scheduled,” and “specified” are used to help the user locate the reference.

1.1.24 Inspector of Record is the individual retained by the District in accordance with titles 21 and 24 of the California Code of Regulations and who will be assigned to the Project. May also be referred to as the Project Inspector.

1.1.25 Install. Whenever this term is used it shall be understood to mean “receive, unload, inventory, store and be responsible for at the project site, transport from point of receipt to final destination, protect, unpack, erect, install in place, anchor, connect, apply, and place in operation or finish, cleaning, complete for intended use.”

1.1.26 Installer. An installer is the 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. 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 trades people of the corresponding generic name.

1.1.27 Locality in which the work is performed means the county in which the Project is located.

1.1.28 Option. Whenever this term is used it shall be understood to mean a choice from among the specified products or procedures which shall be made by the Contractor. The choice is not “whether” the work is to be performed, but “which” product or “which” procedure is to be used. The product or procedure chosen by the Contractor shall be provided at no increase in the cost to the District with no lessening of the Contractor’s responsibility for its performance. All or any options selected or proposed are still subject to all requirements for submittals and for approval of same.

1.1.29 Or Equal and Or Approved Equal. The terms “or equal” and “or approved equal” shall mean “or equal as approved in writing by the Architect”. 

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
1.1.30 **The Project** is the complete construction of the Work performed in accordance with the Contract Documents.

1.1.31 **The Project Manual.** The Project Manual is the volume assembled for the Work which may include, without limitation, the bidding requirements, sample forms, Conditions of the Contract, and Specifications.

1.1.32 **The Project Site.** Project site is the 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.

1.1.33 **Provide** shall include “provide complete in place,” that is “furnish and install.” Complete and ready for the intended use.

1.1.34 **Punch List Inspection.** The inspection performed by the Construction Manager, Architect and the District upon written notification by the Contractor that the Work is substantially complete.

1.1.35 **Regulations.** The term “regulations” includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

1.1.36 **Remaining Work.** Remaining Work means the work required by the Contract, but not required for Substantial Completion, that the District or Architect determines has not been satisfactorily completed at the time of Substantial Completion, deferred commissioning requirements, deferred and seasonal testing, and all maintenance and operating instructions, schedules, reports, guaranties, warranties, bonds, certificates of inspection, marked-up record documents, prevailing wage compliance reports and all other documents as required by the Contract Documents. Remaining Work may also be referred to as Punch List work.

1.1.37 **Safety Orders** are those issued by any cognizant city, county, state or federal agency.

1.1.38 **Site** refers to the grounds of the Project as defined in the Contract Documents and such adjacent lands as may be directly affected by the performance of the Work.

1.1.39 **The Specifications.** The Specifications are that portion of the Contract Documents consisting of the written requirements for material, equipment, construction systems, instructions, quality assurance standards, workmanship, and performance of related services.

1.1.40 **Specification Language.** These Specifications are written in the imperative mood, as defined in the Construction Specifications Institute’s Manual of Practice. Imperative language is directed to the Contractor. The indicative mood is employed on occasion when such sentence structure is necessary to convey the intended meaning in a more accurate or understandable form. The text is streamlined, with the colon (:) employed as a symbol for the words “shall be”, “shall have”, “shall conform with”, “shall comply with”, or “shall meet the requirements of”. The colon is also used to separate a paragraph title or heading from the text that follows.
1.1.41 Standards, Rules, and Regulations referred to are recognized printed standards and shall be considered as one and a part of these specifications within limits specified. Federal, state and local regulations are incorporated into the Contract Documents by reference.

1.1.42 Subcontractor, as used herein, includes those having direct or indirect contracts with Contractor and ones who furnished labor, material or services for a special design according to drawings and specifications of this Work, but does not include ones who merely furnish material not so worked.

1.1.43 Substantial Completion. The date on which the Work or designated portion thereof, as certified by the District Project Manager and Architect, is sufficiently complete, in accordance with the Contract Documents, so the District, may occupy or utilize the Work or designated portion thereof for the use for which it is intended.

1.1.44 Surety is the person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond.

1.1.45 Work of the Contractor or Subcontractor shall include all labor, materials and equipment necessary for the Contractor to fulfill all of its obligations pursuant to the Contract Documents. It shall include the initial obligation of any Contractor or Subcontractor who performs any portion of the Work, to visit the Site of the proposed Work (a continuing obligation after the commencement of the Work), to fully acquaint and familiarize itself with the conditions as they exist and the character of the operations to be carried out under the Contract Documents, and make such investigation as it may see fit so that it shall fully understand the facilities, physical conditions, and restrictions attending the Work under the Contract Documents. Each such Contractor or Subcontractor shall also thoroughly examine and become familiar with the Drawings, Specifications, and associated bid documents before preparing and submitting any bid.

1.1.46 Workers includes laborers, workers, and mechanics.

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 Correlation and Intent

1.2.1.1 Documents Complementary and Inclusive. The Contract Documents are complementary; what is required by one shall be as binding as if required by all. The Contract Documents will be construed in accordance with the laws of the State of California and applicable building codes and statutes of the City and/or County where the Project is located. The intent of the Contract Documents is to describe and provide for a functionally complete and operational Project (or part thereof) to be constructed in accordance with the Contract Documents. All Work, materials, and equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as necessary to properly execute and complete the Work to conform to the requirements of the Contract Documents and provide for a functionally complete and operational Project shall be provided by Contractor with no change in the Contract Sum or Contract Time. A typical or representative detail on the Drawings shall constitute the standard for workmanship and material throughout corresponding parts of the Work. Where necessary, and where reasonably inferable from the Drawings, Contractor shall adapt such representative detail for application to such corresponding parts of the Work with no change in the Contract Sum or Contract Time. The details of such adaptation.
shall be submitted to the City for approval. Repetitive features shown in outline on the Drawings shall be in exact accordance with corresponding features completely shown. All Contract Documents form the Contractor's contract with the District. Any item of Work mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be provided by Contractor as if shown or mentioned in both. Ambiguities or inconsistencies arising as a result of separation of sections or portions of the drawings or specifications by or for subcontractor bidding shall not relieve the Contractor for providing the complete Work at the Contract Price and within the Contract Time.

1.2.1.2 Coverage of the Drawings and Specifications. The Drawings and Specifications generally describe the Work to be performed by Contractor. Generally, the Specifications describe Work which cannot be readily indicated on the Drawings and indicate types, qualities, and methods of installation of the various materials and equipment required for the Work. It is not intended to mention every item of Work in the Specifications, which can be adequately shown on the Drawings, or to show on the Drawings all items of Work described or required by the Specifications even if they are of such nature that they could have been shown. All materials or labor for Work, which is shown on either the Drawings or the Specifications (or is reasonably inferable therefrom as being necessary to complete the Work), shall be provided by the Contractor to provide a complete project. It is intended that the Work be of sound, quality construction, and the Contractor shall be responsible for the inclusion of adequate amounts to cover installation of all items indicated, described, or implied in the portion of the Work to be performed by them.

1.2.1.3 Conflicts. In the event there is a discrepancy between the various Contract Documents, the more stringent, higher quality, and greater quantity of Work shall apply.

1.2.1.4 Conformance with Laws. Each and every provision of law required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, even if through mistake or otherwise any such provision is not inserted, or is not correctly inserted. Before commencing any portion of the Work, Contractor shall check and review the Drawings and Specifications for such portion for conformance and compliance with all laws, ordinances, codes, rules and regulations of all governmental authorities and public and municipal utilities affecting the construction and operation of the physical plant of the Project, all quasi-governmental and other regulations affecting the construction and operation of the physical plant of the Project, and other special requirements, if any, designated in the Contract Documents. Such checking shall include Title 21 and Title 24 of the California Code of Regulations, California Building Code, local utility, local water connection, local grading and all other applicable agencies. In the event Contractor observes any violation of any law, ordinance, code, rule or regulation, or inconsistency with the Contract Documents, Contractor shall, within five (5) days, notify Architect and District in writing of same and shall ensure that any such violation or inconsistency shall be corrected in the manner provided hereunder prior to the construction of that portion of the Project. The Contractor shall bear all expenses of correcting Work done contrary to said laws, ordinances, rules, and regulations if the Contractor performed same (1)
without first consulting the Architect for further instructions regarding said Work or (2) disregarded the Architect’s instructions regarding said work.

1.2.1.5 *Ambiguity and Inconsistency.* Before commencing any portion of the Work, Contractor shall carefully examine all Drawings and Specifications and other information given to Contractor as to materials and methods of construction and other Project requirements. Contractor shall, within five (5) days, notify Architect and District in writing of any perceived or alleged error, inconsistency, conflict, ambiguity, or lack of detail or explanation in the Drawings and Specifications in the manner provided herein. If the Contractor or its Subcontractors, material or equipment suppliers, or any of their officers, agents, and employees performs, permits, or causes the performance of any Work under the Contract Documents, which it knows or should have known to be in error, inconsistent, or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all costs arising therefrom including, without limitation, the cost of correction thereof without increase or adjustment to the Contract Price or the time for performance. If Contractor performs, permits, or causes the performance of any Work under the Contract Documents prepared by or on behalf of Contractor which is in error, inconsistent or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all resulting costs, including, without limitation, the cost of correction, without increase to or adjustment in the Contract Price or the Time for performance. Ambiguities or inconsistencies arising as a result of separation of sections or portions of the drawings or specifications by or for subcontractor bidding shall not relieve the Contractor for providing the complete Work without increase to or adjustment in the Contract Price or the Time for performance.

1.2.2 Addenda and Deferred Approvals

1.2.2.1 *Addenda* are the changes in specifications, drawings, and contract documents, which have been authorized in writing by the District or Architect prior to receipt of bids, and which alter, explain, or clarify the contract documents. Addenda shall govern over all other Contract Documents. Subsequent addenda issued shall govern over prior addenda unless otherwise specified in the addenda.

1.2.2.2 *Deferred Approvals.* Contract Documents which require deferred approval items are meant to be for illustration purposes only. Contractor is responsible for all deferred approval requirements set forth in the Contract Documents. Contractor is responsible to comply with all laws, building codes, and regulations necessary to obtain all necessary approvals, including those required from the Division of the State Architect ("DSA") and the State Fire Marshall. Contractor shall not be granted an extension of time for failure to obtain necessary approvals due to failure to comply with laws, building codes, and other regulations (including Title 24 of the California Code of Regulations). Contractor shall schedule all deferred approval items in its progress schedule pursuant to Article 3. If Contractor fails to include deferred-approval items in its schedule which results in a critical path delay, then Contractor shall be subject to the assessment of liquidated damages.

1.2.2.3 *Deferred Approval Requirements.* Deferred approvals shall be submitted and processed pursuant to the requirements of Division 1 of the Specifications. All deferred approvals shall be prepared by Contractor or Contractor’s agent early enough so as to not delay the Project. Contractor is aware that Title 21
California Code of Regulations Section 17(g) and Title 24 California Code of Regulations Section 4-317 have specific requirements for deferred approval as to governing agencies and as to the Architect and Engineer for the Project. As a result, any delay associated with the time for approval by applicable agencies or by the Architect or Architect's consultants shall be Contractor's.

1.2.3 Specification Interpretation

1.2.3.1 Titles. The Specifications are separated into titled sections for convenience only and not to dictate or determine the trade or craft involved.

1.2.3.2 As Shown, Etc. Where "as shown," "as indicated," "as detailed," or words of similar import are used, reference is made to the Drawings accompanying the Specifications unless otherwise stated. Where "as directed," "as required," "as permitted," "as authorized," "as accepted," "as selected," or words of similar import are used, the direction, requirement, permission, authorization, approval, acceptance, or selection by Architect is intended unless otherwise stated.

1.2.3.3 General Conditions. The General Conditions and supplementary general conditions are a part of each and every section of the Specifications.

1.2.3.4 Abbreviations. In the interest of brevity, the Specifications are written in an abbreviated form and may not include complete sentences. Omission of words or phrases such as "Contractor shall," "shall be," etc., are intentional. Nevertheless, the requirements of the Specifications are mandatory. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the Drawings. In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

1.2.3.5 Plural. Words in the singular shall include the plural whenever applicable or the context so indicates.

1.2.3.6 Metric. The Specifications may indicate metric units of measurement as a supplement to U.S. customary units. When indicated thus: 1" (25 mm), the U. S. customary unit is specific, and the metric unit is nonspecific. When not shown with parentheses, the unit is specific. The metric units correspond to the "International System of Units" (SI) and generally follow ASTM E 380, "Standard for Metric Practice."

1.2.3.7 Standard Specifications. Any reference to standard specifications of any society, institute, association, or governmental authority is a reference to the organization's standard specifications, which are in effect at the date of the Contractor's proposal unless directed otherwise. If applicable specifications are revised prior to completion of any part of the Work, the Contractor may, if acceptable to Architect, perform such Work in accordance with the revised specifications. The standard specifications, except as modified in the Specifications for the Project, shall have full force and effect as though printed in the Specifications. Architect will furnish, upon request, information as to how copies of the standard specifications referred to may be obtained.
1.2.4 Rules of Document Interpretation

1.2.4.1 In the event of conflict within the drawings, the following rules shall apply:

(a) General Notes, when identified as such, shall be incorporated into other portions of Drawings.
(b) Schedules, when identified as such, are complementary with other notes and other portions of Drawings including those identified as General Notes.
(c) Larger scale drawings shall take precedence over smaller scale drawings.
(d) At no time shall the Contractor base construction on scaled drawings.

1.2.4.2 Specifications shall govern as to materials, workmanship, and installation procedures.

1.2.4.3 If Contractor observes that drawings and specifications are in conflict, Contractor shall, within five (5) days, notify the Architect in writing for the purposes of obtaining an interpretation of the Contact Documents.

1.2.4.4 In the case of conflict or inconsistencies, the order of precedence shall be as follows:

(a) General Conditions take precedence over Drawings and Specifications.
(b) Special Conditions take precedence over General Conditions.
(c) The Agreement shall take precedent over the Special Conditions.
(d) In the case of disagreement or conflict between or within standards, specifications, and drawings, the more stringent, higher quality, and greater quantity of Work shall apply.

1.3 OWNERSHIP AND USE OF ARCHITECT’S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

The Drawings, Specifications, and other contract documents for the Project are the property of the District and/or Architect pursuant to Education Code § 17316. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. All copies except the Contractor’s record set, shall be returned or properly accounted for upon completion of the Work. The Drawings, Specifications, and other documents prepared by the Architect, and copies thereof furnished to the Contractor are not to be used by the Contractor or any Subcontractor, Sub-subcontractor, or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work. The District and/or Architect hereby grants the Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings, Specifications, and other documents prepared for the Project in the execution of their Work under the Contract Documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the District’s property interest or other reserved right.
ARTICLE 2

DISTRICT

2.1 INFORMATION AND SERVICES REQUIRED OF THE DISTRICT

2.1.1 Site Survey.

If applicable, the District will furnish, at its expense, a legal description of the Site and a land survey showing the boundaries of the Site. Contractor shall be responsible for all surveys regarding location of construction, grading and site work.

2.1.2 Soils.

When required by the scope of the Project, the District will furnish, at its expense, the services of geotechnical engineers or consultants when reasonably required and deemed necessary by the Architect or as required by local or state codes. Such services, with written reports and appropriate written professional recommendations, may include test boring, test pits, soil bearing values, percolation tests, air and water pollution tests, and ground corrosion and resistivity tests, including necessary operations for determining subsoil, air, and water conditions.

2.1.3 Contractor Reliance.

If appropriate to the Work, a soils investigation report has been obtained from test holes at the Site, and such report is available for the Contractor's use in preparing its bid and Work under this Contract. The soils report is provided for review. Any information obtained from such report or any other information given on drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only. If, during the course of Work under this Contract, Contractor encounters subsurface conditions which differ materially from those indicated in the soils investigation report, then Contractor shall notify the District within five (5) calendar days of discovery of the condition, and changes to the contract price may be made in accordance with Article 7 entitled "Changes in the Work." Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages in the event the Contractor fails to notify District within the five-day period mentioned above.

WARNING: DISTRICT DOES NOT WARRANT THE SOILS AT THE PROJECT SITE. SOILS INVESTIGATION REPORT IS PROVIDED FOR CONTRACTORS INFORMATION ONLY. CONTRACTOR HAS CONDUCTED AN INDEPENDENT INVESTIGATION OF THE PROJECT SITE AND THE SOILS CONDITIONS OF THE SITE. DISTRICT DOES NOT WARRANT THE SOILS CONDITIONS OF THE SITE AND CONTRACTOR IS FULLY RESPONSIBLE TO ASCERTAIN SITE CONDITIONS FOR THE PURPOSES OF DETERMINING CONSTRUCTION MEANS AND METHODS PRIOR TO COMMENCING CONSTRUCTION. THE SOILS INVESTIGATION REPORT IS NOT A CONTRACT DOCUMENT.

2.1.4 Utilities.

2.1.4.1 Regional Notification Center. Contractor, except in an emergency, shall contact the appropriate regional notification center at least two working days prior to commencing any excavation if the excavation will be conducted in an area or in a private

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easement which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and carried out by the Contractor unless such an inquiry identification number has been assigned to the Contractor or any subcontractor of the Contractor and the District has been given the identification number by the Contractor. Any damages arising from failure to make appropriate regional notification shall be at the sole risk of Contractor. Any delays caused by failure to make appropriate regional notification shall be at the sole risk of Contractor and shall not be considered for extension of time pursuant to Paragraph 8.4.

2.1.4.2 Utilities – Removal and Restoration

The District has endeavored to determine the existence of utilities at the Site of the Work from the records of the District of known utilities in the vicinity of the Work. The positions of these utilities as derived from such records are shown in the Contract Documents.

No excavations were made to verify the locations shown for underground utilities. The service connections to these utilities may not be shown on the drawings. It shall be the responsibility of the Contractor to determine the exact location of all service connections. The Contractor shall make its own investigations, including exploratory excavations, to determine the locations and type of service connections, prior to commencing work which could result in damage to such utilities. The Contractor shall immediately notify the District’s representative as to any utility discovered by Contractor in a different position than shown in the Contract Documents or which is not shown on the Contract Documents.

Contractor shall coordinate its Work with all utilities, including, but not limited to electricity, water, gas and telephone and meet with said utilities prior to the start of any work.

2.1.4.3 Other Utilities.

In case it should be necessary to remove, relocate, or temporarily maintain a utility because of interference with the Work, the work on the utility shall be performed and paid for as follows:

When it is necessary to remove, relocate or temporarily maintain a service connection, the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all expenses incidental to the work on the service connection. The work on the service connection shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the service connection has the option of doing such work with his own forces or permitting the work to be done by the Contractor.

When it is necessary to remove, relocate, or temporarily maintain a utility which is in the position shown on the drawings, the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all expenses incidental to the work on the utility. The work on the utility shall be done in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such work with his own forces or permitting the work to be done by the Contractor.

When it is necessary to remove, relocate, or temporarily maintain a utility which is not shown on the drawings or is in a position different from that shown on the drawings and were it in the position shown on the drawings would not need to be removed, relocated, or temporarily maintained, and the
cost of which is not required to be borne by the owner thereof, the District will make arrangements with
the owner of the utility for such work to be done at no cost to the Contractor, or will require the
Contractor to do such work in accordance with Article 7 or will make changes in the alignment and grade
of the Work to obviate the necessity to remove, relocate, or temporarily maintain the utility. Changes in
alignment and grade will be ordered in accordance with Article 7 herein.

No representations are made that the obligations to move or temporarily maintain any utility
and to pay the cost thereof is or is not required to be borne by the owner of such utility, and it shall be
the responsibility of the Contractor to investigate to find out whether said cost is required to be borne
by the owner of the utility.

The right is reserved to governmental agencies and to owners of utilities to enter at any time
upon any street, alley, right-of-way, or easement for the purpose of making changes in their property
made necessary by the Work and for the purpose of maintaining and making repairs to their property.

2.1.5 Existing Utility Lines; Removal, Relocation.

2.1.5.1 Main or Trunkline Facilities

If the Contractor while performing the contract discovers utility facilities not identified by the
District in the Contract Documents, Contractor shall, within five (5) days, notify the District and utility in
writing.

The District has the responsibility to identify, with reasonable accuracy, main or trunkline
facilities on the drawings and specifications. In the event that main or trunkline utility facilities are not
identified with reasonable accuracy in the drawings and specifications, District shall assume the
responsibility for their timely removal, relocation, or protection.

The owner of the public utility shall have the sole discretion to perform repairs or relocation
work or permit the Contractor to do such repairs or relocation work at a reasonable price.

The Contractor shall exercise reasonable care and shall be compensated by the District for the actual verified field costs of locating, and removing, relocating, protecting or temporarily maintaining
such main or trunkline utility facilities not indicated with reasonable accuracy in the drawings and
specifications, and for equipment in use on the project necessarily idled during such work. This work
shall be performed in accordance with Article 7 of these General Conditions.

Alternatively, District may make changes in the alignment and grade of the work to obviate the
need to remove, relocate, or temporarily maintain the utility, in accordance with Article 7 or District
may make arrangements with the owner of the utility for such work to be done at no cost to the
Contractor.

The Contractor shall not be assessed a forfeiture for delay in completion of the Project when
such delay is caused by the failure of the District or the owner of the utility to provide for the removal,
relocation, protection or temporary maintenance of all such main or trunkline facilities not indicated
with reasonable accuracy.

Nothing herein shall preclude the District from pursuing any appropriate remedy against the
utility for delays which are the responsibility of the utility.
Nothing herein shall be construed to relieve the utility from any obligation as required either by law or by contract to pay the cost of removal or relocation of existing utility facilities.

2.1.5.2 Assessment. These subparagraphs shall not be construed to preclude assessment against the Contractor for any other delays in completion of the Work. Nothing in these subparagraphs shall be deemed to require the District to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Site can be inferred from the presence of other visible facilities, such as buildings, or meter junction boxes on or adjacent to the Site.

2.1.5.3 Notification. If the Contractor, while performing Work under this Contract, discovers utility facilities not identified by the District in the Contract Documents, Contractor shall, within five (5) days, notify the District and the utility in writing. If Contractor fails to notify the District within five (5) days after discovery of any utility facilities not identified by District in the Contract Documents, Contractor waives all rights to be compensated for any extra Work or damages resulting from such discovered utilities.

2.1.6 Easements.

District shall secure and pay for easements for permanent structures or permanent changes in existing facilities, if any, unless otherwise specified in the Contract Documents.

2.2 DISTRICT'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, including, but not limited to:

1. Failure to supply adequate workers on the entire Project or any part thereof;
2. Failure to supply a sufficient quantity of materials;
3. Failure to perform any provision of this Contract;
4. Failure to comply with safety requirements, or due to Contractor is creation of an unsafe condition;
5. In the case of bona fide emergency;
6. Failure to order materials in a timely manner;
7. Failure to prepare deferred-approval items or shop drawings in a timely manner;
8. Failure to comply with Contractor's schedule which would result in a delay to the critical path;

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails (within a five-day period after receipt of written notice or a shorter time period expressly stated in the written notice from the District in an emergency situation) to commence and continue correction of such default with diligence and promptness, the District may correct such deficiencies without prejudice to other remedies the District may have, including those set forth in Article 14 after providing five-day written notice to Contractor and Surety. If during this five (5) day period, Surety personally delivers notice to District that it intends to perform such work, District shall allow Surety seven (7) days to perform. In an emergency situation, the District may correct such...
deficiencies without prejudice to other remedies the District may have, including those set forth in Article 14 after providing 48 hours' notice to the Contractor. In either case, the Contractor will be invoiced the cost of correcting such deficiencies, including compensation for additional services and expenses made necessary by such default, or neglect. The invoice amount shall be deducted from the next payment due the Contractor. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the District.
ARTICLE 3

THE CONTRACTOR

3.1 SUPERVISION AND CONSTRUCTION PROCEDURES

3.1.1 Contractor.

The Contractor shall continually supervise and direct the Work using the Contractor’s best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, procedures; and shall coordinate all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. The Contractor shall not perform the Work without utilizing the Contract Documents or, where required, approved shop drawings, product data, or samples for any such portion of the work. If any of the Work is performed by contractors retained directly by the District, Contractor shall be responsible for the coordination and sequencing of the work of those other contractors so as to avoid any impact on the project schedule pursuant to the requirements of Article 6 and Article 8. Specific duties of the Contractor shall include those set out in Section 43 of Title 21 of the California Code of Regulations and Section 4-343 of Title 24 of the California Code of Regulations. These duties include, but are not limited to the following:

(a) Responsibilities. It is the duty of the Contractor to complete the Work covered by his or her contract in accordance with the approved drawings and specifications. The Contractor in no way is relieved of any responsibility by the activities of the Architect, Engineer, Inspector or DSA in the performance of their duties.

(b) Performance of the work. The Contractor shall carefully study the approved drawings and specifications and shall plan its schedule of operations well ahead of time. If at any time it is discovered that work is being done which is not in accordance with the approved drawings and specifications, the contractor shall correct the work immediately.

All inconsistencies or times which appear to be in error in the drawings and specifications shall promptly be called to the attention of the Architect or, Engineer, for interpretation or correction. Local conditions which may affect the structure shall be brought to the Architect’s attention at once. In no case, shall the instruction of the Architect be construed to cause work to be done which is not in conformity with the approved drawings, specifications, change orders, construction change directives, and as required by law.

The Contractor shall not carry on Work except with the knowledge of the Inspector of Record.

(c) Verified Reports. The Contractor shall make and submit to the District from time to time, verified reports as required in Section 36 of Title 21 and Section 4-366 of Title 24.

Contractor shall fully comply with any and all reporting requirements of Education Code Sections 81147, et seq., in the manner prescribed by Title 24, as applicable.
3.1.2 Contractor Responsibility.

The Contractor shall be responsible to the District for acts and omissions of the Contractor’s employees, Subcontractors, material and equipment suppliers, and their agents, employees, invitees, and other persons performing portions of the Work under direct or indirect contract with the Contractor or any of its Subcontractors.

3.1.3 Obligations not Changed by Architect’s Actions.

The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect’s administration of the Contract or by tests, inspections, or approvals required or performed by persons other than the Contractor.

3.1.4 Acceptance/Approval of Work.

The Contractor shall be responsible to determine when any completed portions of the Work already performed under this Contract or provided pursuant to Article 6 are suitable to receive subsequent Work thereon.

3.1.5 Performance of Work With Own Force.

Contractor shall perform at least 15% of the Work, exclusive of supervisory and clerical work without the services of any subcontractor. Contractor shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills as may be necessary to perform the Work in accordance with the Contract Documents.

3.2 SUPERVISION

3.2.1 Full Time Supervision.

Unless personally present on the Project site where the Work is being performed, the Contractor shall keep on the Work at all times during its progress a competent construction Superintendent satisfactory to the District. The Superintendent shall be present on a full-time basis, shall be dedicated exclusively to the Project and shall not share superintendence duties with another project or job. The Superintendent shall not be replaced except with written consent of the District. The Superintendent shall represent the Contractor in its absence and shall be fully authorized to receive and fulfill any instruction from the Architect, the Inspector, the District or any other District representative. All Requests for Information shall be originated by the Superintendent and responses thereto shall be given to the Superintendent. No Work shall begin on any day by any Subcontractor or other person on the Project site until the Superintendent has arrived, or shall any Work continue during the day after the Superintendent has departed from the Project site. The Superintendent shall have authority to bind Contractor through the Superintendent’s acts. The Superintendent shall represent the Contractor, and communications given to the Superintendent shall be binding on the Contractor. Before commencing the Work, Contractor shall give written notice to District and Architect of the name and a Statement of Qualifications of such superintendent for District approval. Superintendent shall not be changed except with written consent of District, unless a superintendent proves to be unsatisfactory to Contractor and ceases to be in its employ, in which case, Contractor shall notify District and Architect in
Contractor shall provide a replacement superintendent approved by the District prior to performing additional work.

3.2.2 Staff.

Notwithstanding other requirements of the contract documents, the Contractor and each Subcontractor shall: (1) furnish a competent and adequate staff as necessary for the proper administration, coordination, supervision, and superintendence of its portion of the Work; (2) organize the procurement of all materials and equipment so that the materials and equipment will be available at the time they are needed for the Work; and (3) keep an adequate force of skilled and fit workers on the job to complete the Work in accordance with all requirements of the Contract Documents.

3.2.3 Right to Remove.

District shall have the right, but not the obligation, to require the removal from the Project of any superintendent, staff member, agent, or employee of any Contractor, Subcontractor, material or equipment supplier.

3.3 LABOR AND MATERIALS

3.3.1 Contractor to Provide.

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, material, equipment, tools, construction equipment and machinery, water, heat, air conditioning, utilities, transportation, and other facilities, services and permits necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

3.3.2 Quality.

Unless otherwise specified, all materials and equipment to be permanently installed in the Project shall be new and shall be of the highest quality or as specifically stated in the Contract Documents. The Contractor shall, if requested, furnish satisfactory evidence as to kind and quality of all materials and equipment within ten (10) days of a written request by the District, including furnishing the District with bona fide copies of invoices for materials or services provided on the Project. All labor shall be performed by workers skilled in their respective trades, and shall be of the same or higher quality as with the standards of other school construction.

3.3.3 Replacement.

Any work, materials, or equipment, which do not conform to these requirements or the standards set forth in the Contract Documents, may be disapproved by the District, in which case, they shall be removed and replaced by the Contractor at no additional cost or extension of time to the District.

3.3.4 Discipline.

The Contractor shall enforce strict discipline and good order among the Contractor’s and Subcontractor’s employees, and other persons carrying out the Contract. The Contractor shall not
permit employment of unfit persons or persons not skilled in tasks assigned to them. As used in this subsection, “unfit” includes any person who the District concludes is improperly skilled for the task assigned to that person, who fails to comply with the requirements of this article, or who creates safety hazards which jeopardize other persons and/or property.

3.3.5 Noise, Drugs, Tobacco, and Alcohol.

Contractor shall take all steps necessary to insure that employees of Contractor or any of its subcontractors’ employees do not use, consume, or work under the influence of any alcohol, tobacco or illegal drugs while on the project. Contractor shall further prevent any of its employees or its subcontractor employees from playing any recorded music devices or radios or wearing any radio headphone devices for entertainment while working on the project. Likewise, Contractor shall prevent its employees or subcontractor’s employees from bringing any animal onto the project. Contractors shall not violate any written school policies.

3.3.6 Delivery of Material.

Contractor shall place orders for materials or equipment so that the Work may be completed in accordance with the Construction schedule for the Work as set forth in Article 8 of this Agreement. Contractor shall, upon demand from the Architect, furnish to the Architect documentary evidence including, but not limited to purchase orders, invoices, bills of materials, work orders and bills of lading, showing that orders have been placed.

3.3.7 Liens and Other Security Interests of Subcontractors and Material Suppliers.

No material, supplies, or equipment for the Work shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver premises, together with all improvements and appurtenances constructed or placed thereon by it, to District free from any claims, security interests, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any Work covered by this Contract shall have any right to place a lien upon the premises or any improvement or appurtenance thereof, except that Contractor may install metering devices or other equipment of a utility company or political subdivision, title to which is commonly retained by the utility company or political subdivision. In event of installation of any such metering device or equipment, Contractor shall advise District as to its owner within five (5) days of such installation in writing, prior to making the installation.

3.3.8 Title to Materials.

The title to new materials or equipment for the Work of this Contract, and attendant liability for its protection and safety, shall remain with Contractor until incorporated in the Work of this Contract and accepted by the District and Architect; no part of said materials shall be removed from its place of storage, and Contractor shall keep an accurate inventory of all said materials and equipment in a manner satisfactory to the District or its authorized representative.
3.3.9 Assemblies.

For all material and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems. Incidental items not indicated on the Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized in the Contract Documents in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer’s most recent published recommendations and specifications.

3.4 WARRANTY

3.4.1 The Contractor warrants to the District that material and equipment furnished under the Contract will be of the highest quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Contractor’s warranty and guaranty to District includes, but is not limited to the following representations:

3.4.1.1 In addition to any other warranties and guaranties provided elsewhere, Contractor shall, and hereby does, warrant all Work after the date of Notice of Completion of Work by District and shall repair or replace any or all such work, together with any other work, which may be displaced in so doing that may prove defective in workmanship or materials within a one (1) year period from date of completion as defined in Public Contract Code Section 7107(c) without expense whatsoever to District, ordinary wear and tear, unusual abuse or neglect excepted. District will give notice of observed defects with reasonable promptness. Contractor shall notify District upon completion of repairs.

3.4.1.2 In the event of failure of Contractor to comply with above mentioned conditions within one week after being notified in writing, District is hereby authorized to proceed to have defects repaired and made good at expense of Contractor who hereby agrees to pay costs and charges therefore immediately on demand.

3.4.1.3 If, in the opinion of the District, defective Work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the District, the District will attempt to give the notice required by this Article. If the Contractor cannot be contacted or does not comply with the District’s requirements for correction within a reasonable time as determined by the District, the District may, notwithstanding the provisions of this article, proceed to make such correction or attention which shall be charged against Contractor. Such action by the District will not relieve the Contractor of the guarantee provided in this Article or elsewhere in this Contract.

3.4.1.4 This Article does not in any way limit the guarantee on any items for which a longer warranty or guaranty is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish District all appropriate guaranty or warranty certificates upon completion of the project.
3.4.2 Format - All Warranties/Guaranties and shall include:

3.4.2.1 Contractor, subcontractor, and equipment supplier shall provide Warranties and Guaranties on their original company letterhead with original signature.

3.4.2.2 Contractor shall provide original Warranties and Guaranties. Photo copies, fax and e-mail copies are not acceptable.

3.4.3 Preparation

3.4.3.1 Contractor shall obtain warranties and guaranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within fifteen (15) days after Notice of Substantial Completion of the applicable Work or Phase of Work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty or guaranty blank until the date of completion is determined by District.

3.4.3.2 Contractor's Response to Construction Warranty and Guaranty Service Requirements: Following oral or written notification by the District, respond to construction warranty and guaranty service requirements within 24 hours, or earlier in case of emergency.

3.4.4 Warranty and/or Guaranty Tags.

At the time of installation of mechanical equipment or other major system elements, tag each warranted or guaranteed item with a durable, oil and water resistant tag approved by the District. Attached each tag with a copper wire and spray with a silicone waterproof coating. The date of Substantial Completion and the Contractor Authorized signature must remain blank until the date the District makes a determination of Substantial Completion. Show the following information on the tag:

**WARRANTY/GUARANTY INFORMATION – [insert project number and name on actual tag]**

a. Type of product/material ________________________________.

b. Model number ________________________________.

c. Serial number ________________________________.

d. Contract number ________________________________.

e. Warranty/Guaranty period _______ (months) from________ to__________________.

f. Inspector's signature ________________________________.

g. Construction Contractor ________________________________.

Address ________________________________________.

Telephone number ________________________________.

h. Warranty or Guaranty contact ________________________________.

Address ________________________________________.

Telephone number ________________________________.

j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.
3.5 **TAXES**

Contractor will pay all applicable Federal, State, and local taxes on all materials, labor, or services furnished by it, and all taxes arising out of its operations under the Contract Documents. District is exempt from Federal Excise Tax, and a Certificate of Exemption shall be provided upon request.

3.6 **PERMITS, FEES AND NOTICES**

3.6.1 Payment.

The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are necessary after execution of the Contract and are legally required by any authority having jurisdiction over the Project, except those required by the Division of the State Architect (DSA). District shall be responsible for all testing and inspection as required by the DSA on-site or within the distance limitations set forth in Paragraph 13.5.2, unless a different mileage range is specified in the Special Conditions.

3.6.2 Compliance.

The Contractor shall comply with and give notices required by any law, ordinance, rule, regulation, and lawful order of public authorities bearing on performance of the Work.

3.6.3 Responsibility.

The Contractor shall perform all Work in conformance with every applicable law, statute, ordinance, building code, rule or regulation. The Contractor shall assume full responsibility for such Work and shall bear the attributable cost of correction or project delay.

3.7 **Not used.**

3.8 **CONTRACTOR’S CONSTRUCTION SCHEDULES**

3.8.1 Requirements.

(a) Within ten (10) calendar days after being awarded the contract, Contractor shall submit a schedule for District’s approval using Microsoft Project, or Oracle Primavera software Contractor shall provide digital schedule files to District on CD for this schedule, and all subsequent progress schedules required by the District. The schedule shall not exceed time limits set forth in the Contract Documents and shall comply with all of the scheduling requirements as set forth in the Specifications. Failure to submit a schedule or submittal of a schedule which shows completion of the Work beyond the specified completion date shall be deemed a material breach by the Contractor. The schedule must indicate the beginning and completion of all phases of construction and shall use the “critical path method” (commonly called CPM) for the value reporting, planning and scheduling, of all Work required under the Contract Documents. The scheduling is necessary for the District’s adequate monitoring of the progress of the Work and shall be prepared in accordance with the time frame described in Article 8 of the General Conditions.
The District may disapprove of any schedule or require modification to it if, in the opinion of the District, adherence to the progress schedule will not cause the Work to be completed in accordance with the Agreement.

(b) Contractor shall not submit a schedule showing early completion without indicating float time through the date set for Project completion by District. Contractor's schedule shall account for all days past early completion as float which belongs to both District and Contractor. Usage of float shall not entitle Contractor to any delay claim or damages due to delay.

(c) Contractor shall not be granted an extension of time for failure to obtain necessary approvals for deferral approvals due to failure to comply with laws, building codes, and other regulations (including Title 24 of the California Code of Regulations). Contractor shall schedule all deferred approval items and shop drawings in its progress schedule. If Contractor fails to include deferred approval items and shop drawings in its schedule which results in a critical path delay, then Contractor shall be subject to the assessment of liquidated damages.

(d) In addition to providing a schedule update every thirty (30) days, the Contractor, if requested by the Architect or District, shall provide revised schedules within ten (10) days if, at any time, the Architect or District, consider the completion date to be in jeopardy because of "activities behind schedule." The additional schedule shall include a new arrow or precedence diagram and schedule reports conforming to the requirements above, designed to show how the Contractor intends to accomplish the Work to meet the completion date. The form and method employed by the Contractor shall be the same as for the original construction schedule accepted by the District. The Contractor shall modify any portions of the schedule that become infeasible because of "activities behind schedule" or for any other valid reason. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule. If Contractor submits a revised schedule showing an earlier completion date for the Project, District's acceptance of this revised schedule shall not entitle Contractor to any delay claim or damages due to any such revised schedule.

(e) Contractor shall include in the schedule all shop drawings, and deferred submittals. Include activities for the submittal, District/Architect's review (minimum duration of 14 calendar days), procurement (or fabrication as applicable); and link the finish of the procurement/fabrication activity to the start of the related field activity at the Site.

3.8.2 Failure to Meet Requirements.

Failure of the Contractor to provide proper schedules as required by this Article and Article 9 is a material breach of the contract and grounds for termination pursuant to Article 14. The District, at its sole discretion, may choose, instead, to withhold, in whole or in part, any progress payments or retention amounts otherwise payable to the Contractor.
3.9 Not used.

3.10 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the Site for the District one current copy of the International Building Code, Titles 19, 21 and 24 of the California Code of Regulations and one record copy of the Drawings, Specifications, Addenda, Change Orders, and other Modifications, in good order and marked currently to record changes and selections made during construction. In addition, the Contractor shall maintain at the Site approved Shop Drawings, Product Data, Samples, and similar required submittals. These documents shall be available to the District, and shall be delivered to the District upon completion of the Work.

3.11 SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SUBSTITUTIONS

3.11.1 Submittals defined.

3.11.1.1 Shop Drawings. The term "shop drawings" as used herein means drawings, diagrams, schedules, and other data, which are prepared by Contractor, Subcontractors, manufacturers, suppliers, or distributors illustrating some portion of the Work, and includes: illustrations; fabrication, erection, layout and setting drawings; manufacturer's standard drawings; schedules; descriptive literature, instructions, catalogs, and brochures; performance and test data including charts; wiring and control diagrams; and all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment, or systems and their position conform to the requirements of the Contract Documents. The Contractor shall obtain and submit with shop drawings all seismic and other calculations and all product data from equipment manufacturers. "Product data" as used herein are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work. As used herein, the term "manufactured" applies to standard units usually mass-produced, and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements. Shop drawings shall: establish the actual detail of all manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical systems and equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions.

3.11.1.2 Samples. The term "samples" as used herein are physical examples furnished by Contractor to illustrate materials, equipment, or quality and includes natural materials, fabricated items, equipment, devices, appliances, or parts thereof as called for in the Specifications, and any other samples as may be required by the District/Architect to determine whether the kind, quality, construction, finish, color, and other characteristics of the materials, etc., proposed by the Contractor conform to the required characteristics of the various parts of the Work. All Work shall be in accordance with the approved samples.

3.11.1.3 Contractor's Responsibilities. Contractor shall obtain and shall submit all required shop drawings, samples, etc., required by the Specifications with such promptness as to cause no delay in its own Work. or in that of any other contractor or subcontractor but in no event later than ten (10) days after the award of the Contract. No extensions of time will be granted to Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule. Each Subcontractor shall submit all shop drawings, samples, and manufacturer's
descriptive data for the review of the District, the Contractor, and the Architect through the Contractor. By submitting shop drawings, product data, samples, etc., the Contractor represents that it has determined and verified all materials, field measurements, catalog numbers, related field construction criteria, and other relevant data in connection with each such submission, and that it has checked, verified, and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents, including the construction schedule. The submission of the shop drawings, product data, samples, etc., shall not deviate from the requirements of the Contract Documents including detailing and design intent which is specifically outlined in Contract Documents except as specifically authorized by the District/Architect or through an accepted substitution pursuant to Paragraph 3.10.4. All deviations from the Contract Documents shall be narratively described in a transmittal accompanying the shop drawings. However, shop drawings shall not be used as a means of requesting a substitution, the procedure for which is defined in Paragraph 3.10.4, "Substitutions.” Review by District and Architect shall not relieve the Contractor or any Subcontractor from its responsibility in preparing and submitting proper shop drawings in accordance with the Contract Documents. Any submission, which in District/Architect's opinion is incomplete, contains errors, or has been checked superficially will be returned un-reviewed by the District/Architect for re-submission by the Contractor. Contractor shall stamp, sign, and date each submittal indicating its representation that the submittal meets all of the requirements of the Contract Documents and evidence Contractor’s review through execution of the following stamp to be placed on each shop drawings:

"The contractor has reviewed and approved the field dimensions and the construction criteria, and has also made written notation regarding any information in the shop drawings that does not conform to the contract documents. This shop drawing has been coordinated with all other shop drawings received to date by contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the engineers on this project.

___________________________
Signature of Contractor and date

3.11.1.4 Extent of Review. In reviewing shop drawings, the District nor the Architect will not verify dimensions and field conditions. The Architect will review and approve shop drawings, product data, samples, etc., for aesthetics and for conformance with the design concept of the Work and the information in the Contract Documents. The District nor the Architect’s review shall neither be construed as a complete check which relieves the Contractor, Subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist or from any departures or deviations from the requirements of the Contract Documents unless the Contractor has, in writing, called the District’s/Architect’s attention to the deviations at the time of submission. The District’s or Architect’s review shall not relieve the Contractor or Subcontractors from responsibility for errors of any sort in shop drawings or schedules, for proper fitting of the Work, coordination of the differing subcontractor trades and shop drawings and Work which is not indicated on the shop drawings at the time of submission of shop drawings. Contractor and Subcontractors shall be solely responsible for any quantities which may be shown on the submittals or Contract Documents.

3.11.2 Drawing Submission Procedure.

3.11.2.1 Transmittal Letter and Other Requirements. All shop drawings must be properly identified with the name of the Project and dated, and each lot submitted must be accompanied by a letter of transmittal referring to the name of the Project and to the Specification section number for

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identification of each item clearly stating in narrative form, as well as “clouding” on the submissions, all qualifications, departures, or deviations from the Contract Documents. Shop drawings, for each section of the Work shall be numbered consecutively and the numbering system shall be retained throughout all revisions. All Subcontractor submissions shall be made through the Contractor. Each drawing shall have a clear space for the stamps of the Architect and Contractor.

3.11.2.2 Copies Required. Unless otherwise approved by the District, each submittal shall include six (6) legible prints of each drawing or schedule, table, cut sheet, etc., including fabrication, erection, layout and setting drawings, and such other drawings as required under the various sections of the Specifications, until final acceptance thereof is obtained. Subcontractor shall submit copies, in an amount as requested by the Contractor, of: (1) manufacturers’ descriptive data for materials, equipment, and fixtures, including catalog sheets showing dimensions, performance, characteristics, and capacities; (2) wiring diagrams and controls; (3) schedules; (4) all seismic calculations and other calculations; and (5) other pertinent information as required by the District or Architect.

3.11.2.3 Corrections. The Contractor shall make all corrections required by District/Architect and shall resubmit, as required by District/Architect, corrected copies of shop drawings or new samples until approved. Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections required by the District/Architect on previous submissions. Professional services required for more than one (1) re-review of required submittals of shop drawings, product data, or samples are subject to charge to the Contractor pursuant to Paragraph 4.4.

3.11.2.4 Approval Prior to Commencement of Work. No portion of the Work requiring a shop drawing or sample submission or other submittal shall be commenced until the submission has been reviewed by Contractor and Architect and approved by Architect unless specifically directed in writing by the District. All such portions of the Work shall be in accordance with approved shop drawings and samples.

3.11.3 Sample Submissions Procedure.

3.11.3.1 Samples Required. In case a considerable range of color, graining, texture, or other characteristics are anticipated in finished products, a sufficient number of samples of the specified materials shall be furnished by the Contractor to indicate the full range of characteristics which will be present in the finished products; and products delivered or erected without submittal and approval of a full range of samples shall be subject to rejection. Except for range samples, and unless otherwise called for in the various sections of the Specifications, samples shall be submitted in duplicate. All samples shall be marked, tagged, or otherwise properly identified with the name of the submitting party, the name of the Project, the purpose for which the samples are submitted and the date, and shall be accompanied by a letter of transmittal containing similar information, together with the Specification section number. Each tag or sticker shall have clear space for the review stamps of Contractor and Architect.

3.11.3.2 Labels and Instructions. All samples of materials shall be supplied with the manufacturer’s descriptive labels and application instructions.

3.11.3.3 Architect’s Review. The Architect will review and, if appropriate, approve submissions and will return them to the Contractor with the Architect’s stamp and signature applied thereto, indicating the timing for review and appropriate action in compliance with the Architect’s (or District’s) standard procedures.

3.11.3.4 Not used.
3.11.3.5  Not used.

3.11.3.6  District's Property. All shop drawings, computer disks, annotated specifications, samples and other submittals shall become the District's property upon receipt by the District or Architect.

3.11.4 Substitutions.

3.11.4.1  One Product Specified. Unless the Specifications state that no substitution is permitted, whenever the Contract Documents indicate any specific material, product, thing or service, or any specific name, make, trade name, or catalog number, with or without the words "or equal," such specification shall be deemed to be used for the purpose of facilitating description of the material, product, thing or service desired and shall be deemed to be followed by the words "or equal" unless the Contract Documents specify "no substitution allowed", "no equal", "no equivalent", or other language with similar meaning, in which case no substitutions will be allowed. Pursuant to Paragraph 3.11.4.3, the Contractor may, unless otherwise stated, within three (3) work days after the bid opening, submit a substitution request for any material, product, thing or service, which shall be materially equal or better in every respect to that so indicated or specified ("Specified Item") and will completely accomplish the purpose of the Contract Documents.

(a) Products Specified Which are Commercially Unavailable. If the Contractor fails to make a request for substitutions for products, within three (3) work days after bid opening, and such products subsequently become commercially unavailable, the Contractor may request a substitution for such commercially unavailable item. The decision to grant this request is solely at the District's discretion. The written approval of the District, consistent with the procedure for Change Orders, shall be required for the use of a proposed substitute material. The District may condition its approval of the substitution upon the delivery to District of an extended warranty or guaranty or other assurances of adequate performance of the substitution as well as an equitable deduction in the contract sum should the substituted item cost less than the Specified Item. All risks of delay due to the approval of a requested substitution by the District, DSA, or any other governmental agency having jurisdiction, shall be on the requesting party. All additional costs, all procurement and construction delays, and all costs for review by the Architect or its consultants shall be the responsibility of the Contractor and will be deducted from Contractor’s pay request.

3.11.4.2 Substitution Request Form. Requests for substitutions of materials, products, things or services in place of a Specified Item must be submitted to the District in writing on the District's Substitution Request Form ("Request Form") within three (3) work days after bid opening, except as provided for in Paragraph 3.11.4.1.

The Request Form must be accompanied by evidence as to whether the proposed substitution:

1. Is equal in quality/service/ability to the Specified Item;
2. Will entail no changes in detail, construction, and scheduling of related work;
3. Will be acceptable in consideration of the required design and artistic effect;
4. Will provide no cost disadvantage to the District;
5. Will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts; and
6. Will required no change of the construction schedule.
3.11.4.3 In completing the Request Form, the bidder shall state, with respect to each requested substitution, that the bidder will agree to provide the Specified Item in the event that the District denies the bidder's request for such requested substitution. In the event the District denies the bidder's requested substitution for a Specified Item, the bidder shall provide the Specified Item without any additional cost or charge to the District, and waives all rights to submit a claim.

3.11.4.4 After bids are opened, the apparent lowest bidder shall provide, within three (3) days of opening such bids, any and all Drawing, Specifications, samples, performance data, calculations, and other information, as may be required to assist the Architect and the District in determining whether the proposed substitution is acceptable. The burden of establishing these facts shall be upon the bidder.

3.11.4.5 After the District's receipt of such evidence by the bidder, the District will make its final decision as to whether the bidder's request for substitution for any Specified Items will be granted. The decision as to whether a proposed request for substitution is equal to a Specified Item shall be at the sole discretion of the District. Any request for substitution that is granted by the District shall be documented and processed through a Change Order. The District may condition its approval of any substitution upon delivery to the District of an extended warranty or guaranty or other assurances of adequate performance of the substitution. Any and all risks of delay due to approval by the District, DSA or any other governmental agency having jurisdiction shall be on the bidder.

3.11.4.6 If the Architect and District accept a proposed substitution, the Contractor agrees to pay for all District expenses, including but not limited to Division of the State Architect fees, engineering and design services, compensation to the Architect and affected engineers for their required time to process such substitution through the Division of the State Architect, if required, and to make all changes and adjustments in materials or the work of all trades directly or indirectly affected by the substituted item or items at no cost to the District.

3.12 INTEGRATION OF WORK

3.12.1 Scope.

The Contractor shall be responsible for cutting, fitting, or patching to complete the Work and to make all parts fit together properly. Contractor shall be responsible for ensuring that all trades are coordinated and scheduled so as to ensure the timely and proper execution of the work. When modifying existing work or installing new Work adjacent to existing work, Contractor shall match, as closely as conditions of Site and materials will allow, the finishes, textures, and colors of the original work, refinishing existing work at no additional cost to District. All cost caused by defective or ill-timed work shall be borne by Contractor. Contractor shall be solely responsible for protecting existing work on adjacent properties and shall obtain all required permits for shoring and excavations near property lines.

3.12.2 Structural Members.

New or existing structural members and elements, including reinforcing bars and seismic bracing, shall not be cut, bored, or drilled except by written authority of the Architect. Work done contrary to such authority is at the Contractor's risk and subject to replacement at its own expense without reimbursement under the Contract. Schedule delays resulting from Agency approvals for unauthorized work shall be the Contractor's responsibility.
3.12.3 Subsequent Removal.

Permission to patch any areas or items of the Work shall not constitute a waiver of the District's or the Architect’s right to require complete removal and replacement of the areas of items of the Work if, in the opinion of the Architect or the District, the patching does not satisfactorily restore quality and appearance of the Work or does not otherwise conform to the Contract Documents.

3.13 CLEANING UP

3.13.1 Contractor’s Responsibility.

Contractor at all times shall keep premises free from debris such as waste, dust, excess water, storm water runoffs, rubbish, and excess materials and equipment. Contractor shall not leave debris under, in, or about the premises, but shall promptly remove same from the premises and dispose of it in a lawful manner. Disposal receipts or dump tickets shall be furnished to the Architect within five (5) days of request. Upon completion of Work, Contractor shall clean interior and exterior of buildings, including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections, and any areas where debris has collected, so surfaces are free from foreign material or discoloration; Contractor shall clean and polish all glass, plumbing fixtures, equipment, finish hardware and similar finish surfaces. Upon completion of the Work, Contractor shall also remove temporary utilities, fencing, barricades, planking, sanitary facilities and similar temporary facilities from Site.

Contractor shall remove rubbish and debris resulting from the Work on a daily basis. Contractor shall maintain the structures and Site in a clean and orderly condition at all times until acceptance of the project by the District. Contractor shall keep its access driveways and adjacent streets, sidewalks, gutters and drains free of rubbish, debris and excess water by cleaning and removal each day.

3.13.1.1 In addition to the general cleaning, the following special cleaning shall be done at the completion of the work in accordance with the specifications including, but not limited to:

(a) Remove putty stains from glazing, then wash and polish glazing.

(b) Remove marks, stains, fingerprints and other soil or dirt from painted, stained or decorated work.

(c) Remove temporary protection and clean and polish floors and waxed surfaces.

(d) Clean and polish hardware and plumbing trim; remove stains, dust, dirt, plaster and paint.

(e) Remove spots, soil, plaster and paint from tile work, and wash tile.

(f) Clean all fixtures and equipment, remove excess lubrication, clean light fixtures and lamps, polish metal surfaces.

(g) Vacuum-clean carpeted surfaces.

(h) Remove debris from roofs, down spout and drainage system.
3.13.2 Failure to Cleanup.

If the Contractor fails to clean up as provided in the Contract Documents, the District may do so, and the cost thereof shall be the responsibility of the Contractor and deducted from the next progress payment.

3.14 ACCESS TO WORK

The Contractor shall provide the District, the Architect, Engineers and the Inspector of Record, access to the Work in preparation and progress wherever located. Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions.

CONTRACTOR IS AWARE THAT THIS CONTRACT MAY BE SPLIT INTO SEVERAL PHASES AS ADDRESSED IN ARTICLE 6.

3.15 ROYALTIES AND PATENTS

3.15.1 Payment and indemnity for Infringement.

Contractor shall hold and save the District and its officers, agents, and employees, the Architect, and the Architect's consultants harmless from liability of any nature or kind, including cost and expense, for or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the District, unless otherwise specifically provided in the contract documents, and unless such liability arises from the sole negligence, or active negligence, or willful misconduct of the District, the Architect, or the Architect's consultants.

3.15.2 Review.

The review by the Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be for its adequacy for the Work and shall not be an approval for the use by the Contractor in violation of any patent or other rights of any person or entity.

3.16 INDEMNIFICATION

3.16.1 Contractor.

Contractor shall defend, indemnify and hold harmless District, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors from all liabilities, claims, actions, liens, judgments, demands, damages, losses, costs or expenses of any kind arising from death, personal injury, property damage or other cause based or asserted upon any act, omission, or breach connected with or arising from the progress of Work or performance of service under this Agreement or the Contract Documents. As part of this indemnity, Contractor shall protect and defend, at its own expense, District, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors from any legal action including attorneys fees or other proceeding based upon such act, omission, or breach.

Furthermore, Contractor agrees to and does hereby defend, indemnify and hold harmless District, Architect, Inspector, the State of California and their officers, employees, agents and
independent contractors from every claim or demand made, and every liability, loss, damage, expense or attorneys fees of any nature whatsoever, which may be incurred by reason of:

(a) Liability for (1) death or bodily injury to persons; (2) damage or injury to, loss (including theft), or loss of use of, any property; (3) any failure or alleged failure to comply with any provision of law or the Contract Documents; or (4) any other loss, damage or expense, sustained by any person, firm or corporation or in connection with the Work called for in this Agreement or the Contract Documents, except for liability resulting from the sole or active negligence, or the willful misconduct of the District.

(b) Any bodily injury to or death of persons or damage to property caused by any act, omission or breach of Contractor or any person, firm or corporation employed by Contractor, either directly or by independent contract, including all damages or injury to, loss (including theft), or loss of use of, any property, sustained by any person, firm or corporation, including District, arising out of or in any way connected with Work covered by this Agreement or the Contract Documents, whether said injury or damage occurs either on or off District property, but not for any loss, injury, death or damages caused by the sole or active negligence or willful misconduct of the District.

(c) Any dispute between Contractor and Contractor’s subcontractors/supplies/sureties, including, but not limited to, any failure or alleged failure of the Contractor (or any person hired or employed directly or indirectly by the Contractor) to pay any Subcontractor or Materialman of any tier or any other person employed in connection with the Work and/or filing of any stop notice or mechanic’s lien claims.

Contractor, at Contractor’s own expense, cost, and risk, shall defend any and all claims, actions, suits, or other proceedings that may be brought or instituted against the District, its officers, agents or employees, or founded upon any cause, damage, or injury identified herein Section 3.16.1 and shall pay or satisfy any judgment that may be rendered against the District, its officers, agents or employees in any action, suit or other proceedings as a result thereof.

Contractor shall ensure that its contract with each of its subcontractors contains provisions requiring the subcontractors to defend, indemnify and hold harmless the District, Architect, Inspector, the State of California to a minimum level as set forth in this Article and consistent with the language of 3.16.1.

The Contractor’s and Subcontractors’ obligation to defend, indemnify and hold harmless the District, Architect, Inspector, the State of California and their officers, employees, agents and independent contractors hereunder shall include, without limitation, any and all claims, damages, and costs for the following: (1) any damages or injury to or death of any person, and damage or injury to, loss (including theft), or loss of use of, any property; (2) breach of any warranty or guaranty, express or implied; (3) failure of the Contractor or Subcontractors to comply with any applicable governmental law, rule, regulation, or other requirement; and (4) products installed in or used in connection with the Work.
3.17  **SUBMISSION OF DAILY REPORTS**

3.17.1  General.

At the close of each working day, the Contractor shall submit a daily report to the District and the Inspector, on forms approved by the District, together with applicable delivery tickets, listing all labor, materials, and equipment involved for that day. An attempt shall be made to reconcile the report daily, and it shall be signed by a District representative and the Contractor. In the event of disagreement, pertinent notes shall be entered by each party to explain points which cannot be resolved that day. Each party shall retain a signed copy of the report. Reports by subcontractors or others shall be submitted through the Contractor.

3.17.2  Labor.

The report required by Paragraph 3.17.1 shall show names of workers, classifications, hours worked.

3.17.3  Materials.

The report required by Paragraph 3.17.1 shall describe materials used.

3.17.4  Equipment.

The report required by Paragraph 3.17.1 shall show type of equipment, size, and hours of operation, including loading and transportation, if applicable.

3.18  **EXECUTION OF THE WORK**

3.18.1  Examination.

3.18.1.1  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 all observations in writing.

3.18.1.2  Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

3.18.1.3  Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3.18.1.4  Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.18.2  Existing Site and/or Building 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.
Before construction, verify the location and points of connection of all utility services for the entire Project.

3.18.3 Existing Utilities.

The existence and location of underground and other utilities and construction indicated in the Contract Documents as existing are not guaranteed. Prior to beginning the Work investigate and verify the existence and location of all underground utilities and/or other improvements affecting the Work.

3.18.3.1 Before construction, verify the location and invert all elevations at points of connection of sanitary sewer, storm sewer, and water-service piping; and all underground electrical services.

3.18.3.2 Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.18.4 Preparation.

Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a written request for information (RFI) to the District.

Existing Utility Information: Furnish information to the District and Architect 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. Contractor shall coordinate with authorities having jurisdiction.

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, Contractor shall investigate and verify all dimensions of other construction by field measurements before fabrication. Contractor shall coordinate fabrication schedule with construction progress to avoid delaying the Work.

Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Contract Documents. Contractor shall be responsible for all coordination and measurements including means and methods of Construction.

3.18.5 Construction Layout.

Verification: Before proceeding to lay out the Work, Contractor shall verify layout information and Field condition in relation to the Contract documents. Notify District and Architect immediately of any discrepancies.

3.18.6 Installation.

General Contractor shall locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

3.18.6.1 Make vertical work plumb and make horizontal work level.

3.18.6.2 Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3.18.6.3 Conceal pipes, ducts, and wiring in furnished areas, unless otherwise indicated.

3.18.6.4 Maintain minimum headroom clearance of eight feet in spaces without a suspended ceiling.

3.18.7 Contractor shall comply with manufacturer’s written instructions and recommendations for installing products in applications indicated.

3.18.8 Contractor shall install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for performance until accepted by District.

3.18.9 Contractor shall conduct construction operations so no part of the Work is subjected to damage or loading in excess of that expected during normal conditions of occupancy.

3.18.10 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.

3.18.11 Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

3.18.12 Allow for building movement, including thermal expansion and contraction.

3.18.13 Coordinate installation of anchorages. 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.

3.18.14 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.

3.18.15 Hazardous Materials: Use only products, cleaners, and installation materials that are not classified as or considered hazardous.

3.18.16 District-Installed Products

3.18.16.1 Site Access: Provide access to Project site for District’s construction forces.

3.18.16.2 Coordination: Coordinate construction and operations of the Work with work performed by District construction forces.

3.18.16.3 Construction Schedule: Inform District of Contractor’s preferred construction schedule for District’s portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify District and Architect if changes to schedule are required due to differences in actual construction progress.

3.18.16.4 Pre-installation Conferences: Include District’s construction forces at pre-installation conferences covering portions of the Work that are to receive
District’s work. Attend pre-installation conferences conducted by District’s construction forces if portions of the Work depend on District’s construction forces.

3.19 **DSA VERIFIED REPORTS AND CERTIFICATE OF COMPLIANCE**

3.19.1 Contractor Actions.

The Contractor acknowledges and agrees that a material obligation of the Contractor under the Contract Documents is the completion by the Contractor of all actions and activities which by the Contract Documents or by operation of applicable law, code, rule or regulation are the responsibility of the Contractor relating to DSA reporting requirements pursuant to Education Code §81141 (including amendments thereto) and issuance of DSA’s Certificate of Compliance for the Project pursuant to Education Code §81147 (including amendments thereto) upon completion of Project construction. The foregoing shall include without limitation, the timely preparation, completion and filing of Verified Reports during Project construction and the filing of the Final Verified Report with DSA within ten (10) days of the determination of Project Final Completion. The Contractor shall provide the Project Inspector, Architect, Construction Manager retained by the District for the Project and the District with copies of all Verified Reports completed by the Contractor and submitted to DSA; such copies shall be provided to the Project Inspector, Architect, the Construction Manager and the District concurrently with the Contractor’s submission thereof to DSA.


Notwithstanding any provision of the Contract Documents to the contrary, the completion and filing of the Final Verified Report with DSA by the Contractor is an express condition precedent to the District’s disbursement of Twelve Thousand Dollars ($12,000) of the Contract Sum due the Contractor under this Agreement ("the Final Verified Report Value"). The Final Verified Report Value is in addition to, and not in lieu of, retention withheld and retained by the District from Progress Payments disbursed to the Contractor during Project construction. The District’s disbursement of the Final Verified Report Value to the Contractor shall be made by the District within thirty (30) days of the presentation by the Contractor to the Project Inspector, Architect, Construction Manager and District of reasonably satisfactory written evidence that the Contractor has filed the Contractor’s Final Verified Report with DSA in accordance with the preceding and the submission of a billing statement by the Contractor to the District for payment of the Final Verified Report Value. If the Contractor fails to file the Final Verified Report with DSA within ten (10) days of the determination of Project Final Completion, notwithstanding the preparation or filing of such Final Verified Report by the Contractor thereafter, the District may in the sole and exclusive discretion of the District retain and withhold from disbursement to the Contractor all or any part of the Final Verified Report Value as damages for the failure of the Contractor to have timely discharged its obligations hereunder.

3.20 **NOISE CONTROL**

The Contractor shall be responsible for the installation and maintenance of noise reducing devices on construction equipment. Contractor shall comply with the requirements of the city and county having jurisdiction with regard to noise ordinances governing construction sites and activities. Construction equipment noise is subject to the control of the Environmental Protection Agency’s Noise Control Program (Part 204 of Title 40, Code of Federal Regulations). If classes are in session at any point
during the progress of the Project, and, in the District’s reasonable discretion, the noise from such Work disrupts or disturbs the students or faculty or the normal operation of the college, at the District’s request, the Contractor shall schedule the performance of all such Work around normal campus hours or make other arrangements so that the Work does not cause such disruption or disturbance. In no event shall Contractor have a right to receive additional compensation or an extension to the contract time as a result of any such rescheduling or the making of such arrangements. These controls shall be implemented during site preparation and construction.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

4.1.1 Replacement of Architect.

In the case of the termination of the Architect, the District may appoint an architect or another construction professional or may perform such functions with its own licensed professional personnel. The status of the replacement Architect under the Contract Documents shall be the same as that of the former architect.

4.2 ARCHITECT’S ADMINISTRATION OF THE CONTRACT

4.2.1 Status.

Pursuant to Titles 24 and 21 of the California Code of Regulations and as required pursuant to the Field Act, Education Code 81130 et. seq. the Architect will provide administration of the Contract Documents and the Work, and will be a District representative during construction, as well as during the one (1) year period following the commencement of any warranties or guaranties. The Architect will have authority to act on behalf of the District only to the extent provided in the Contract Documents.

4.2.2 Site Visits.

The Architect will visit the Site at intervals necessary in the judgment of the Architect to become generally familiar with the progress and quality of the Work and to determine in general if the Work is being performed in accordance with the Contract Documents.

4.2.3 Limitations of Construction Responsibility.

The Architect shall not have control over, charge of, or be responsible for construction means, methods, techniques, schedules, sequences or procedures, fabrication, procurement, shipment, delivery, receipt, installation, or for safety precautions and programs in connection with the Work, since these are solely the Contractor’s responsibility under the Contract Documents. The Architect shall not be responsible for the Contractor’s, Subcontractors’, material or equipment suppliers’, or any other person’s schedules or failure to carry out the Work in accordance with the Contract Documents. The Architect shall not have control over or charge of acts or omissions of the Contractor, Subcontractors, their agents or employees, or any other persons or entities performing or supplying portions of the Work. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect’s administration of the
Contract Documents, or by tests, inspections, or approvals required or performed by persons other than the Contractor.

4.2.4 Communications Facilitating Contract Administration.

Except as otherwise provided in the Contract Documents the Contractor shall communicate through the District representative. The District representative shall be promptly informed, and shall receive copies of all written communications. Contractor shall not rely upon any communications from the District that is not from the District's representative. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material or equipment suppliers shall be through the Contractor.

4.2.5 Payment Applications.

The Architect will review and make recommendations to the District regarding the amounts due the Contractor on the Certificates for Payment pursuant to Article 9 and subject to the Inspector's approval and Architect's observation.

4.2.6 Rejection of Work.

In addition to the rights, duties, and obligations of the Inspector under this Article, the Architect may recommend to the District that the District reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable to achieve the intent of the Contract Documents, the Architect may recommend to the District that the District require additional inspection or testing of the Work in accordance with Paragraph 13.5, whether or not such Work is fabricated, installed, or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.2.7 Warranties and Guaranties Upon Completion.

The Architect, in conjunction with the District and Inspector will conduct field reviews of the Work to determine the date of completion, shall receive and forward to the District for the District's review and records written warranties, guaranties, and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment when the Architect believes the Work has been completed in compliance with the requirements of the Contract Documents. The handling by the Architect of such warranties, guaranties, maintenance manuals, or similar documents shall not diminish or transfer to the Architect any responsibilities or liabilities required by the Contract Documents of the Contractor or other entities, parties, or persons performing or supplying the Work.

The Architect will conduct a field review of the Contractor's comprehensive list of items to be completed or corrected (final punch list) and one (1) follow-up field review if required. The cost incurred by the District for further field reviews or the preparation of further punch lists by the Architect shall be invoiced to the Contractor and deducted from the final payment.
4.2.8 Interpretation.

The Architect will interpret and decide matters concerning performance and requirements of the Contract Documents.

4.2.9 Additional Instructions.

4.2.9.1 Typical Parts and Sections. Whenever typical parts or sections of the Work are completely detailed on the Drawings, and other parts or sections which are essentially of the same construction are shown in outline only, the complete details shall apply to the Work which is shown in outline.

4.2.9.2 Dimensions. Dimensions of Work shall not be determined by scale or rule. Figured dimensions shall be followed at all times. If figured dimensions are lacking on Drawings, Architect shall supply them on request. The Architect’s decisions on matters relating to aesthetic effect will be final.

4.3 INSPECTOR OF RECORD

4.3.1 General.

One or more project inspectors employed by the District and approved by the Division of the State Architect will be assigned to the Work in accordance with the requirements of Title 24 of the California Code of Regulations. The Inspector(s) duties are as specifically defined in Title 24.

4.3.2 Inspector’s Duties.

All Work shall be under the observation of the Inspector. The Inspector shall have free access to any or all parts of the Work at any time. The Contractor shall furnish the Inspector such information as may be necessary to keep the Inspector fully informed regarding progress and manner of Work and character of materials. Such observations shall not, in any way, relieve the Contractor from responsibility for full compliance with all terms and conditions of the Contract, or be construed to lessen to any degree the Contractor’s responsibility for providing efficient and capable superintendence. The Inspector is not authorized to make changes in the drawings or specifications nor shall the Inspector’s approval of the Work and methods relieve the Contractor of responsibility for the correction of subsequently discovered defects, or from its obligation to comply with the Contract Documents.

4.3.3 Inspector’s Authority to Reject or Stop Work.

The Inspector shall have the authority to reject Work whenever provisions of the Contract Documents are not being complied with, and Contractor shall instruct its Subcontractors and employees accordingly. In addition, the Inspector may stop any Work that poses a probable risk of harm to persons or property. The Contractor shall instruct its employees, Subcontractors, material and equipment suppliers, etc., accordingly. The absence of any Stop Work order or rejection of any portion of the Work shall not relieve the Contractor from any of its obligations pursuant to the Contract Documents.

4.3.4 Inspector’s Facilities.

Within seven (7) days after notice to proceed, the Contractor shall provide the Inspector with the temporary facilities as required under Division 1 of the Specifications.
4.3.5 Testing Times.

The District will provide inspection and testing at its cost during the normal eight (8) hour day Monday through Friday (except holidays). Work by the Contractor outside of the normal eight (8) hour day shall constitute an authorization from the Contractor to the District to provide inspection and testing as required outside of the normal eight (8) hour day. Contractor shall reimburse District for any additional costs associated with inspection and testing (including re-inspection and re-testing) outside the normal eight-hour day and for any retests caused by the Contractor.

4.4 RESPONSIBILITY FOR ADDITIONAL CHARGES INCURRED BY THE DISTRICT FOR PROFESSIONAL SERVICES

If at any time prior to the completion of the requirements under the Contract Documents, the District is required to provide or secure additional professional services for any reason by any act of the Contractor, the Contractor shall be invoiced by the District for any costs incurred for any such additional services, which costs shall be deducted from the next progress payment. Such invoicing shall be independent from any other District remedies and shall not be considered a waiver of any District rights or remedies. If payments then or thereafter due to the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the District. Additional services shall include, but shall not be limited to, the following:

(a) Services made necessary by the default of the Contractor.
(b) Services made necessary due to the defects or deficiencies in the Work of the Contractor.
(c) Services required by failure of the Contractor to perform according to any provision of the Contract Documents.
(d) Services in connection with evaluating substitutions of products, materials, equipment, Subcontractors' proposed by the Contractor, and making subsequent revisions to drawings, specifications, and providing other documentation required (except for the situation where the specified item is no longer manufactured or available).
(e) Services for evaluating and processing claims submitted by the Contractor in connection with the Work outside the established Change Order process.
(f) Services required by the failure of the Contractor to prosecute the Work in a timely manner in compliance within the specified time of completion.
(g) Services in conjunction with the testing, adjusting, balancing and start-up of equipment other than the normal amount customarily associated for the type of Work involved.
(h) Services in conjunction with more than one (1) re-review of submittals of shop drawings, product data, samples, etc.

4.5 DISPUTES

4.5.1 Decision of Architect.

Disputes between District and Contractor involving money or time, including those alleging an error or omission by the Architect, shall be referred initially to the Architect for action as provided in
Paragraph 4.5.2. A decision by the Architect, as provided in Paragraph 4.5.5, shall be required as a condition precedent to proceeding with remedies set forth in Paragraph 4.5.6 as to all such matters arising prior to the date final payment is due, regardless of whether such matters relate to execution and progress of the Work, or the extent to which the Work has been completed. The decision by the Architect in response to a Claim shall not be a condition precedent to the remedies under Paragraph 4.5.2 through 4.5.5 in the event: (1) the position of Architect is vacant; (2) the Architect has not received evidence or has failed to render a decision within agreed time limit; (3) the Architect has failed to take action required under Paragraph 4.6.4 within thirty (30) days after the Claim is made, forty-five (45) days have passed after the Claim has been referred to the Architect; or (4) the Claim relates to a Stop Notice Claim not arising from any extra change order or Construction Change Directive for which approval has not been provided.

4.5.2 Architect's Review.

The Architect will review Claims and take one or more of the following preliminary actions within ten (10) days of receipt of a Claim: (1) request additional supporting data from the Claimant; (2) submit a schedule to the parties indicating when the Architect expects to take action; (3) reject the Claim in whole or in part, stating reasons for rejection; (4) recommend approval of the Claim; or (5) suggest a compromise. The Architect may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

4.5.3 Documentation if Resolved.

If a Claim has been resolved, the Architect will prepare or obtain appropriate documentation.

4.5.4 Actions if Not Resolved.

If a Claim has not been resolved and all documentation requested pursuant to Paragraph 4.5.2 has been provided, the party making the Claim shall, within ten (10) days after the Architect's preliminary response, take one or more of the following actions: (1) modify the initial Claim; (2) notify the Architect that the initial Claim stands; or (3) supplement with additional supporting data.

4.5.5 Architect's Written Decision.

If a Claim has not been resolved after consideration of the foregoing and of other evidence presented by the parties or requested by the Architect, the Architect will notify the parties in writing that the Architect's decision will be made within twenty (20) days. Upon expiration of such time period, the Architect will render to the parties its written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both. The Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

4.5.6 Continuing Contract Performance.

Pending final resolution of a Claim, including, negotiation, mediation, arbitration, or litigation, the Contractor shall proceed diligently with performance of the Contract, and the District shall continue to make any undisputed payments in accordance with the Contract. If the dispute is not resolved, Contractor agrees it will neither rescind the contract nor stop the progress of the work, but Contractor's sole remedy shall be to submit such controversy to determination by a court of competent jurisdiction in the county where the project is located, after the project has been completed, and not before. At the
District's sole option, the District may submit individual disputes for binding arbitration and Contractor agrees to the resolution determined for each individual dispute by Arbitrator, including resolution of time and delays. If binding arbitration is utilized for individual disputes, such resolution is full and final as to that particular Claim.

4.5.7 Claims for Concealed Trenches or Excavations Greater Than Four Feet Below the Surface.

When any excavation or trenching extends greater than four feet below the surface or if any condition involving hazardous substances are encountered:

(a) Immediately upon discovery, The Contractor shall promptly, and before the following conditions are disturbed, notify the District, by telephone and in writing, of the condition except:

1. If such condition is a hazardous waste condition, and Contractor's bid includes removal or disposal of hazardous substances. Material that the Contractor believes may be a material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law. In such case, the notice bulletin procedures of Article 7 apply.

2. Subsurface or latent physical conditions at the Site differing from those indicated.

3. 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.

(b) The District shall investigate the conditions, and if District finds that the conditions do materially so differ, do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work shall issue a change order or construction change directive under the procedures described in the Contract.

(c) In the event that a dispute arises between the District and the Contractor whether the conditions materially differ, involve hazardous waste, or cause a decrease or increase in 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 the Contract, but shall proceed with all Work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

4.5.8 Claims for Extension of Time.

If Contractor and District cannot agree upon an extension of time, whether compensable or not, then Contractor must have first completed the procedures set forth in Paragraph 8.4. Upon completion of the procedures set forth under Paragraph 8.4, Contractor must then comply with the requirements in this Article including those set forth under Paragraph 4.5.9.
4.5.9 Claims Procedures.

4.5.9.1 Procedure applicable to all Claims:

(a) Definition of Claim: A "Claim" means a separate demand by the Contractor for (1) time extension, (2) payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or the Claimant is not otherwise entitled to, or (3) and amount the payment of which is disputed by the District.

(b) Filing Claim is Not Basis To Discontinue Work: The Contractor shall promptly comply with Work under the Contract or Work requested by the District even though a written Claim has been filed. The Contractor and the District shall make good faith efforts to resolve any and all Claims that may arise during the performance of the Work covered by this contract.

(c) Claim Notification: The Contractor shall within seven (7) calendar days after the Claim arises, submit a notification, in writing, with the District stating clearly the basis for the Claim. If the notification is not submitted within seven (7) days after the Claim arises, the Contractor shall be deemed to have waived all right to assert the Claim, and the Claim shall be denied. Claims submitted after the final payment date shall also be considered null and void by the District. All Claims shall be reviewed pursuant to Paragraph 4.5.1, 4.5.2, and 4.5.5. In order to qualify as a Claim, the written notice must state that it is a Claim submitted under this paragraph of these General Conditions.

(d) Formal Claim Appeal Submission: If the Contractor does not concur with the District's decision regarding the Claim Notification, the Contractor will issue a formal Claim Appeal within fourteen (14) days of receipt of the District's decision and all detailed information in support of the Claim Appeal within thirty (30) days. All appeals shall be submitted before final payment. If the Claim Appeal is not submitted within fourteen (14) calendar days and detailed information within thirty (30) days, the Contractor shall be deemed to have waived its right to assert the Claim and the Claim shall be denied. Contractor's failure to submit any detailed information which is in the possession of Contractor shall render such information inadmissible by Contractor at trial or arbitration.

(e) Appeal Claim Format: The Contractor shall provide all written detailed documentation which supports the Claim, including but not limited to: arguments, justifications, cost, estimates, schedule analysis and detailed documentation. The format of the Claim Appeal shall be as follows:

1. Cover letter.
2. Summary of factual basis of Claim and amount of Claim.
3. Summary of the basis of the Claim, including the specific clause and section under the Contract under which the Claim is made.
4. Documents relating to the Claim, including:
a. Specifications
b. Drawings
c. Clarifications (RFI's)
d. Other relevant information
e. Analysis of claim merit.
f. Analysis of claim cost.
g. For Claims relating to time extensions, an analysis and supporting documentation evidencing any effect upon the critical path.
h. Certification.
i. Chronology of events and related correspondence.
j. Daily reports and logs.

(f) Certification: The Contractor (and subcontractors, if applicable) shall submit with the Claim a certification under penalty of perjury:

(1) That the Contractor has reviewed the Claim and that such Claim is made in good faith;

(2) Supporting data are accurate and complete to the best of the Contractor’s knowledge and belief;

(3) The amount requested accurately reflects the amount of compensation for which the Contractor believes the District is liable.

(4) That the Contractor is familiar with Government Code Sections 12650 et seq. and Penal Code Section 72 and that false Claims can lead to substantial fines and/or imprisonment.

(g) Signature of Certification: If the Contractor is not an individual, the certification shall be executed by an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor’s affairs.

(h) Mandatory Claim Appeal Procedure: The Contractor’s Claim Appeal shall be denied if it fails to provide the written basis of the Claim and certification as set forth herein.

(i) District May Request Additional Information: Within thirty (30) days of receipt of the Claim Appeal and the information under this Article, the District may request in writing any additional documentation supporting the Claim or documentation relating to defenses to the Claim which the District may assert.

4.5.9.2 Binding Arbitration of Individual Claim Issues. At the District’s sole option, the District may submit individual disputes, or Claims, to binding arbitration and Contractor agrees to the resolution determined for each individual dispute by Arbitrator, including resolution of time and delays. If binding arbitration is utilized, such resolution is a full and final resolution of the particular Claim or dispute. Under no circumstances may the Contractor stop work, rescind its contract or otherwise slow the progress of Work during resolution of individual Claims in binding Arbitration.

4.5.9.3 Resolution of Disputes in Court of Competent Jurisdiction. If Claims are not resolved under the procedure set forth and pursuant to Article 4.5.9.2, such Claim
or controversy shall be submitted to a court in the county of competent jurisdiction after the Project has been completed, and not before.

4.5.9.4 Warranties, Guaranties and Obligations. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guaranties and obligations imposed upon Contractor by the General Conditions and amendments thereto; and all of the rights and remedies available to District and Architect thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by laws or regulations by special warranty or guaranty or by other provisions of the Contract Documents, and the provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 Subcontractual Relations

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the same obligations and responsibilities, assumed by Contractor pursuant to the Contract Documents. Each subcontract agreement shall preserve and protect the rights of the District and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound. Upon written request of the Subcontractor, the Contractor shall identify to the Subcontractor the terms and conditions of the proposed subcontract agreement, which may be at variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.1.2 Subcontractor Licenses.

All subcontractors shall be properly licensed by the California State Licensing Board.

5.1.3 Substitution of Subcontractor

Substitution of Subcontractors shall be permitted only as authorized under Public Contract Code §§ 4107 et. Seq. Any substitutions of Subcontractors shall not result in any increase in the Contract Price or result in the granting of any extension of time for the completion of the Project.
5.1.4 Contingent Assignment of Subcontracts and Other Contracts

Each subcontract and other contract or agreement for any portion of the Work is hereby assigned by the Contractor to the District provided that:

(a) Such assignment is effective only after termination of this contract with the Contractor by the District as provided herein and only for those subcontracts and other contracts and agreements that the District accepts by notifying the Subcontractor or Materialman (as may be applicable) in writing; and

(b) Such assignment is subject to the prior rights of the Surety(ies) obligated under the Payment Bond and Performance Bond.

The Contractor shall include adequate provisions for this contingent assignment of subcontracts and other contracts and agreements in each such document.

ARTICLE 6

CONSTRUCTION BY DISTRICT OR BY SEPARATE CONTRACTORS

6.1 DISTRICT’S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 Separate Contracts.

(a) District reserves the right to let other contracts in connection with this Work. Contractor shall afford other contractors reasonable opportunity for (1) introduction and storage of their materials; (2) access to the Work; and (3) execution of their work. Contractor shall properly connect and coordinate its work with that of other Contractors.

(b) If any part of Contractor’s Work depends on proper execution or results of any other contractor, the Contractor shall inspect and within seven (7) days or less, report to Architect, in writing, any defects in such work that render it unsuitable for proper execution of Contractor’s work. Contractor will be held accountable for damages to District for that work which it failed to inspect or should have inspected. Contractor’s failure to inspect and report shall constitute its acceptance of other contractors’ work as fit and proper for reception of its work, except as to defects which may develop in other contractors’ work after execution of Contractor’s work.

(c) To ensure proper execution of its subsequent Work, Contractor shall measure and inspect Work already in place and shall at once report to the Architect in writing any discrepancy between executed Work as built and the Contract Documents.

(d) Contractor shall ascertain to its own satisfaction the scope of the Project and nature of any other contracts that have been or may be awarded by District in prosecution of the Project and the potential impact of such work on Contractor’s schedule.

(e) Nothing herein contained shall be interpreted as granting to Contractor the exclusive occupancy at the site of Project. Contractor shall not cause any
unnecessary hindrance or delay to any other contractor working on the Project Site. If execution of any contract by the District is likely to cause interference with Contractor's performance of its contract, District shall decide which contractor shall cease work temporarily and which contractor shall continue, or whether work can be coordinated so that contractors may proceed simultaneously.

(f) District shall not be responsible for any damages suffered or extra costs incurred by Contractor resulting directly or indirectly from award or performance or attempted performance of any other contract or contracts at the Project, or caused by any decision or omission of District respecting the order of precedence in performance of contracts.

CONTRACTOR IS AWARE THAT THIS CONTRACT MAY BE SPLIT INTO SEVERAL PHASES. IF THE CONTRACT IS SPLIT INTO PHASES THEN CONTRACTOR HAS MADE ALLOWANCE FOR ANY DELAYS OR DAMAGES WHICH MAY ARISE FROM COORDINATION WITH CONTRACTORS FOR OTHER PHASES. IF ANY DELAYS SHOULD ARISE FROM ANOTHER CONTRACTOR WORKING ON A DIFFERENT PHASE, CONTRACTOR'S SOLE REMEDY FOR DAMAGES, INCLUDING DELAY DAMAGES, SHALL BE AGAINST THE CONTRACTOR WHO CAUSED SUCH DAMAGE AND NOT THE DISTRICT. CONTRACTOR SHALL PROVIDE ACCESS TO OTHER CONTRACTORS FOR OTHER PHASES AS NECESSARY TO PREVENT DELAYS AND DAMAGES TO OTHER CONTRACTORS WORKING ON OTHER PHASES OF CONSTRUCTION.

6.1.2 District’s Right to Carry Out the Work.

See Paragraph 2.2.

6.1.3 Designation as Contractor.

When separate contracts are awarded to contractors on the Project Site, the term “Contractor” in the Contract Documents in each case shall mean the Contractor who executes each separate District/Contractor Agreement.

6.1.4 Contractor Duties.

The Contractor shall have overall responsibility to reasonably coordinate and schedule Contractor’s activities with the activities of the District’s own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the District in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors, and the District until subsequently revised. Additionally, Contractor shall coordinate with Architect and District inspector to ensure timely and proper progress of work.

6.2 CONSTRUCTIVE OWNERSHIP OF PROJECT SITE AND MATERIAL

Upon commencement of Work, the Contractor becomes the constructive owner of the entire site, improvements, material and equipment on Project site. Contractor must ensure proper safety and storage of all materials and assumes responsibility as if Contractor was the owner of the Project site.
risk of loss or damage shall be borne by Contractor during the Work until the date of Completion. As construction owner, Contractor must carry adequate insurance in case of calamity and is not entitled to rely on the insurance requirements as set forth in this agreement as being adequate coverage in case of calamity.

6.3 **DISTRICT’S RIGHT TO CLEAN UP**

If a dispute arises among the Contractor, separate contractors, and the District as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Paragraph 3.12, the District may clean up and allocate the cost among those it deems responsible.

**ARTICLE 7**

**CHANGES IN THE WORK**

7.1 **CHANGES**

7.1.1 **No Changes Without Authorization.**

There shall be no change whatsoever in the drawings, specifications, or in the Work without an executed Change Order, Construction Change Directive, or order by the Architect for a minor change in the Work as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District’s Governing Board has authorized the same and the cost thereof approved in writing by Change Order or executed Construction Change Directive. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted in writing in the Change Order. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications. Notwithstanding anything to the contrary in this Article 7, all Change Orders shall be prepared and issued by the District and shall become effective when executed by the District’s Governing Board, the Architect, the Contractor, and the DSA.

Should any Change Order result in an increase in the Contract Sum, the cost of such Change Order shall be agreed to, in writing, in advance by Contractor and District and be subject to the monetary limitations set forth in Public Contract Code Section 20659. In the event that Contractor proceeds with any change in Work without first notifying District and obtaining the Architect’s and District’s consent to a Change Order, Contractor waives any claim of additional compensation for such additional work.

**CONTRACTOR UNDERSTANDS, ACKNOWLEDGES, AND AGREES THAT THE REASON FOR THIS NOTICE REQUIREMENT IS SO THAT DISTRICT MAY HAVE AN OPPORTUNITY TO ANALYZE THE WORK AND DECIDE WHETHER THE DISTRICT SHALL PROCEED WITH THE CHANGE ORDER OR ALTER THE PROJECT SO THAT SUCH CHANGE IN WORK BECOMES UNNECESSARY.**

7.1.2 **Architect Authority.**

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Sum, or an extension of the Contract Time, or when a change which is
inconsistent with the intent of the Contract Documents. Such changes shall be effected by written
Change Order and shall be binding on the District and the Contractor. The Contractor shall carry out
such written orders promptly.

7.2  CHANGE ORDERS ("CO")

A CO is a written instrument prepared by the Architect and signed by the District (as authorized
by the District’s Governing Board), the Contractor, the Architect, stating their agreement upon all of the
following:

(a) A description of a change in the Work;
(b) The amount of the adjustment in the Contract Sum, if any; and
(c) The extent of the adjustment in the Contract Time, if any.

7.3  CONSTRUCTION CHANGE DIRECTIVE

7.3.1 Definition.

A Construction Change Directive is a written order prepared by the Architect and signed by the
District and the Architect, directing a change in the Work and stating a proposed basis for adjustment, if
any, in the Contract Sum or Contract Time, or both. The District may by Construction Change Directive,
without invalidating the Contract, order changes in the Work within the general scope of the Contract
consisting of additions, deletions, or other revisions within. If applicable, the Contract Sum and Contract
Time will be adjusted accordingly. In the case of a Construction Change Directive being issued,
Contractor must commence Work immediately or delays from failure to perform Construction Change
Directive shall be the responsibility of Contractor. Any dispute as to the sum of Construction Change
Directive or timing of payment, shall be resolved pursuant to Paragraph 4.5.

7.3.2 Use to Direct Change

A Construction Change Directive shall be used in the absence of agreement on the terms of a
CO. A copy of a proposed form is provided at the end of this Article.

7.4  REQUEST FOR INFORMATION ("RFI")

7.4.1 Definition.

An RFI is a written request prepared by the Contractor requesting the District to provide
additional information necessary to clarify or amplify an item which the Contractor believes is not
clearly shown or called for in the drawings or specifications, or to address problems which have arisen
under field conditions.

7.4.2 Scope.

The RFI shall reference all the applicable Contract Documents including specification section,
detail, page numbers, drawing numbers, and sheet numbers, etc. The Contractor shall make
suggestions and interpretations of the issue raised by the RFI. An RFI cannot modify the Contract Sum,
Contract Time, or the Contract Documents.
7.4.3 Response Time.

The Architect must respond to a RFI within a reasonable time after receiving such request. If the Architect's response results in a change in the Work, then such change shall be effected by a written CO or Construction Change Directive, if appropriate. If the Architect cannot respond to the RFI within a reasonable time, the Architect shall notify the Contractor, with a copy to the Inspector and the District, of the amount of time that will be required to respond.

7.4.4 Costs Incurred.

The Contractor shall be responsible for any costs incurred for professional services, which shall be deducted from the next progress payment, if an RFI requests an interpretation or decision of a matter where the information sought is equally available to the party making such request. District, at its sole discretion, shall invoice Contractor for all such professional services arising from this Article.

7.5 REQUEST FOR PROPOSAL ("RFP")

7.5.1 Definition.

An RFP is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change on the Contract Sum and the Contract Time.

7.5.2 Scope.

An RFP shall contain adequate information, including any necessary drawings and specifications, to enable Contractor to provide the cost breakdowns required by Paragraph 7.7. The Contractor shall not be entitled to any Additional Compensation for preparing a response to an RFP, whether ultimately accepted or not.

7.6 CHANGE ORDER REQUEST ("COR")

7.6.1 Definition.

A COR is a written request prepared by the Contractor requesting that the District and the Architect issue a CO based upon a proposed change called for in an RFP or a claim pursuant to Paragraph 4.5.

7.6.2 Changes in Sum.

A COR shall include breakdowns per Paragraph 7.7 to validate any change in Contract Sum due to proposed change or claim.

7.6.3 Changes in Time.

A COR shall also include any additional time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Project Schedule as defined in Paragraph 3.8 of the General Contract. If contractor
fails to request a time extension in a COR, then the Contractor is thereafter precluded from requesting or claiming a delay.

7.7  COST OF CHANGE ORDERS

7.7.1  Scope.

Within ten (10) days after a request is made for a change that impacts the Contract Sum as defined in Paragraph 9.1, the critical path, or the Contract Time as defined in Paragraph 8.4.2, the Contractor shall provide the District and the Architect, with a written estimate of the effect of the proposed CO upon the Contract Sum and the actual cost of construction, which shall include a complete itemized cost breakdown of all labor and material showing actual quantities, hours, unit prices, and wage rates required for the change, and the effect upon the Contract Time of such CO. Changes may be made by District by an appropriate written CO, or, at the District’s option, such changes shall be implemented immediately upon the Contractor’s receipt of an appropriate written Construction Change Directive.

District may, as provided by law and without affecting the validity of this Agreement, order changes, modifications, deletions and extra work by issuance of written Construction Change Directives from time to time during the progress of the Project, contract sum being adjusted accordingly. All such work shall be executed under conditions of the original Agreement except that any extension of time caused thereby shall be adjusted at time of ordering such change. District has discretion to order changes on a “time and material” basis with adjustments to time made after Contractor has justified through documentation the impact on the critical path of the Project.

7.7.2  Determination of Cost.

The amount of the increase or decrease in the Contract Price from a CO, if any, shall be determined in one or more of the following ways as applicable to a specific situation:

(a)  Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. If an agreement cannot be reached within fifteen (15) days after submission and negotiation of Contractor’s proposal, Contractor may submit pursuant to Paragraph 7.7.3. Submission of sums which have no basis in fact are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code Section 12650 et. seq.;

(b)  By unit prices contained in Contractor’s original bid and incorporated in the Project documents or fixed by subsequent agreement between District and Contractor;

(c)  Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee. However, in the case of disagreement, Contractor must utilize the procedure under section 7.7.3; or

(d)  By cost of material and labor and percentage of overhead and profit. If the value is determined by this method the following requirements shall apply:
1. **Basis for Establishing Costs.**

   a. Labor will be the actual cost for wages prevailing locally for each craft or type of workers at the time the extra Work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State, or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the extra Work cost will not be permitted unless the Contractor establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.

   b. Materials shall be at invoice or lowest current price at which such materials are locally available and delivered to the Site in the quantities involved, plus sales tax, freight, and delivery.

   The District reserves the right to approve materials and sources of supply or to supply materials to the Contractor if necessary for the progress of the Work. No markup shall be applied to any material provided by the District.

   c. Tool and Equipment Rental. No payment will be made for the use of tools which have a replacement value of $250 or less.

   Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental agencies or distributors at the time the Work is performed.

   The rental rates paid shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals.

   Necessary loading and transportation costs for equipment used on the extra Work shall be included. If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to the District than holding it at the Work Site, it shall be returned unless the Contractor elects to keep it at the Work Site at no expense to the District.

   All equipment shall be acceptable to the Inspector, in good working condition, and suitable for the purpose for which it is to be used. Manufacturer's ratings and modifications shall be used to classify equipment, and equipment shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

   d. Other items. The District may authorize other items which may be required on the extra work. Such items include labor, services, material, and equipment which are different in their nature from those required by the Work, and which are of a type not ordinarily available from the Contractor or any of the Subcontractors. Invoices covering all such items in detail shall be submitted with the request for payment.
e. Invoices. Vendors’ invoices for material, equipment rental, and other expenditures shall be submitted with the COR. If the request for payment is not substantiated by invoices or other documentation, the District may establish the cost of the item involved at the lowest price which was current at the time of the Daily Report.

f. Overhead. Overhead, including direct and indirect costs, shall be submitted with the COR and include: home office overhead, off-site supervision, CO preparation/negotiation/research, time delays, project interference and disruption, additional guaranty and warranty durations, on-site supervision, additional temporary protection, additional temporary utilities, additional material handling costs, and additional safety equipment costs.

7.7.3 Format for Proposed Cost Change.

The following format shall be used as applicable by the District and the Contractor to communicate proposed additions and deductions to the Contract. A copy of a proposed Construction Change Directive form is provided at the end of this Article.

<table>
<thead>
<tr>
<th></th>
<th>EXTRA</th>
<th>CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Material (attach itemized quantity and unit cost plus sales tax)</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Labor (attach itemized hours and rates)</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Equipment (attach invoices)</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Subtotal</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>If Subcontractor performed Work, add Subcontractor's overhead and profit to portions performed by Sub-contractor, not to exceed fifteen percent (15%) of item (d).</td>
<td></td>
</tr>
</tbody>
</table>
(f) Liability and Property Damage Insurance, Worker's, Compensation Insurance, Social Security, and Unemployment Taxes, not to exceed as follows: FICA @ 6.2% - with a wage ceiling of $84,900; Medicare @ 1.45% - no wage ceiling; FUTA @ .8% - with a wage ceiling of $7,000; ETT and SUI @ 2.3% - with a wage ceiling of $7,000; Workers' Compensation @ 5.94%; Liability and Property Damage @ 2.5%. Total not-to-exceed is 19.19%. (Note: Modifications to these percentages will be evaluated and possibly modified only on a case-by-case basis and only after proper proof of alternate percentages are documented and approved in advance. In addition, as wage ceilings are met, those corresponding percentages must drop from the "burden" calculations).

(g) Subtotal

(h) General Contractor's Overhead and Profit: Not to exceed fifteen percent (15%) of Item (g) if Contractor performed the work. No more than five percent (5%) of Item (g) if Subcontractor performed the work. If work was performed by Contractor and Subcontractors, portions performed by Contractor shall not exceed fifteen percent (15%) if Item (g), and portions performed by Subcontractor shall not exceed five percent (5%) of Item (g)

(i) Subtotal

(j) Bond not to exceed one percent (1%) of Item (g)

(k) TOTAL

(l) Time

The undersigned Contractor approves the foregoing Construction Change Directive as to the changes, if any, and the contract price specified for each item and as to the extension of time allowed, if any, for completion of the entire work on account of said Construction Change Directive, and agrees to furnish all labor, materials and service and perform all work necessary to complete any additional work...
specified therein, for the consideration stated herein. It is understood that said Construction Change
Directive shall be effective when approved by the Governing Board of the District.

It is expressly understood that the value of such extra Work or changes, as determined by any of
the aforementioned methods, expressly includes any and all of the Contractor’s costs and expenses,
both direct and indirect, resulting from additional time required on the Project or resulting from delay to
the Project. Any costs, expenses, damages or time extensions not included are deemed waived.

The Contractor expressly acknowledges and agrees that any change in the Work performed shall
not be deemed to constitute a delay or other basis for claiming additional compensation based on
theories including, but not limited to, acceleration, suspension or disruption to the Project.

7.7.4 Net Deductive Change Orders

All net deductive Change Order(s) must be prepared pursuant to Paragraph 7.7.3. Contractor
will be allowed a maximum of 5% total profit and overhead. If subcontractor work is involved,
subcontractors shall be entitled to a maximum of 5% profit and overhead on the deducted work. Any
deviation from this Article shall not be allowed.

7.7.5 Discounts, Rebates, and Refunds.

For purposes of determining the cost, if any, of any change, addition, or omission to the Work
hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and
equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so
that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be
allowed as a reduction of the Contractor’s cost in determining the actual cost of construction for
purposes of any change, addition, or omissions in the Work as provided herein.

7.7.6 Accounting Records.

With respect to portions of the Work performed by COs and Construction Change Directives on
a time-and-materials, unit-cost, or similar basis, the Contractor shall keep and maintain cost-accounting
records satisfactory to the District, which shall be available to the District on the same terms as any
other books and records the Contractor is required to maintain under the Contract Documents.

7.7.7 Notice Required.

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension
in the Contract Time for completion, it shall notify the District pursuant to Paragraph 4.5 and this Article.
No claim shall be considered unless made in accordance with this subparagraph. Contractor shall
proceed to execute the Work even though the adjustment may not have been agreed upon. Any change
in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a
CO.

7.7.8 Applicability to Subcontractors.

Any requirements under this Article 7 shall be equally applicable to COs or Construction Change
Directives issued to Subcontractors by the Contractor to the same extent required by the Contractor.
7.7.9 Alteration to Change Order Language.

Contractor shall not alter Change Orders or reserve time in Construction Change Directives. Contractor shall execute finalized Change Orders and proceed under Paragraph 7.7.7 and Paragraph 4.5 with proper notice. If Contractor intends to reserve time, without an approved CPM schedule prepared pursuant to Paragraph 3.8 then Contractor may be prosecuted pursuant to the False Claim Act.

ARTICLE 8

TIME

8.1 DEFINITIONS

8.1.1 Contract Time.

Unless otherwise provided, Contract Time is the period of time, in calendar days, including authorized adjustments, allotted in the Contract Documents for Completion of the Work.

8.1.2 Notice to Proceed.

District may give a notice to proceed within three (3) months of the award of the bid by District. Once Contractor has received the notice to proceed, Contractor shall complete the Work in the period of time referenced in the Contract Documents.

In the event that District desires to postpone the giving of the notice to proceed beyond this two-month period, it is expressly understood that with reasonable notice to the Contractor, the giving of the date to proceed may be postponed by District. It is further expressly understood by Contractor, that Contractor shall not be entitled to any Claim of additional compensation as a result of the postponement of the giving of the notice to proceed.

If the Contractor believes that a postponement will cause a hardship to Contractor, Contractor may terminate the contract with written notice to District within 10 days after receipt by Contractor of District’s notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the contract as a result of a notice of postponement, District shall have the authority to award the contract to the next lowest responsible bidder.

8.1.3 Computation of Time.

The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

The Contractor will only be allowed a time extension for unusually severe weather if it results in precipitation or other conditions which in the amount, frequency, or duration is in excess of the norm at the location and time of year in question as established by National Oceanic and Atmospheric Administration (NOAA) weather data. No less than three work days allocated equally across the Contract...
Time will be identified as non-working weather days in the contractor’s schedule for the entire contract period of performance. The weather days shall be shown on the schedule and if not used will become float for the Project’s use. A day-for-day extension will only be allowed for those days in excess of the norm. The Contractor is expected to work seven (7) days per week (if necessary, irrespective of inclement weather), to maintain access, and to protect the Work under construction from the effects of inclement weather.

If the weather is unusually severe and is in excess of the NOAA data norm and prevents the Contractor from beginning work at the usual daily starting time, or prevents the Contractor from proceeding with seventy-five (75%) of the normal labor and equipment force towards completion of the day's current controlling item on the accepted construction schedule for a period of at least five hours, and the crew is dismissed as a result thereof, the Architect will designate such time as unavoidable delay and grant one (1) work-day extension.

8.2 HOURS OF WORK.

8.2.1 Sufficient Forces.

Contractors and Subcontractors shall continuously furnish sufficient forces to ensure the prosecution of the Work in accordance with the Construction Schedule.

8.2.2 Performance During Working Hours.

Work shall be performed during regular working hours as permitted by the District except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

8.2.3 Costs for After Hours Inspections.

If the Contract Documents require Work to be done outside the Inspector’s regular working hours, the costs of any after hour inspections, shall be borne by the District.

If the District allows the Contractor to do Work outside regular working hours for the Contractor's convenience, or if required to maintain schedule, the costs of any inspections required outside regular working hours shall be invoiced to the Contractor by the District and deducted from the next Progress Payment.

If the Contractor elects to perform Work outside the Inspector’s regular working hours, costs of any inspections required outside regular working hours shall be invoiced to the Contractor by the District and deducted from the next Progress Payment.

8.3 PROGRESS AND COMPLETION.

8.3.1 Time of the Essence.

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.
8.4 EXTENSIONS OF TIME – LIQUIDATED DAMAGES

8.4.1 Liquidated Damages.

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount specified in the Construction Agreement for each calendar day of delay in completion. Any liquidated damages recovered by the District shall not, however, limit the District’s right to separately recover any actual out-of-pocket damages it suffers due to Contractor’s delay. Contractor and his surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

8.4.2 Excusable Delay.

Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault or negligence of Contractor or its subcontractors, including acts of God, as defined in Public Contract Code Section 7107, acts of enemy, epidemics and quarantine restrictions. Contractor shall within five (5) calendar days of beginning of any such delay notify District in writing of causes of delay; thereupon District shall ascertain the facts and extent of delay and grant extension of time for completing Work when, in its judgment, the findings of fact justify such an extension. Extensions of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted after proper compliance with Paragraph 3.8 requiring preparation and submission of a properly prepared CPM schedule.

No extended overhead, general conditions costs, impact costs, out-of-sequence costs or any other type of compensation, by any name or characterization, shall be paid to the Contractor for any delay to any activity not designated as a critical path item on the latest approved Project schedule.

The Contractor shall notify the District and Architect in writing of any anticipated delay and its cause, in order that the District and Architect may take immediate steps to prevent, if possible, the occurrence or continuance of delay, and may determine whether the delay is to be considered unavoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

In the event the Contractor requests an extension of Contract time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in work. When requesting time, i.e., extensions, for proposed Change Orders, they must be submitted with the proposed Change Order with full justification and documentation. If the Contractor fails to submit justification with the proposed Change Order it waives its right to a time extension at a later date. Such justification must be based on the District accepted construction schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the scope of work. The justification must include, but is not limited to, the following information:
(a) The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform these activities within the stated duration.

(b) Logical ties to the District accepted construction schedule for the proposed changes and/or delay showing the activity/activities in the schedule whose start or completion dates are affected by the change and/or delay. (A fragment of any delay of over ten (10) days must be provided.)

The Contractor and District understand and expressly agree that insofar as Public Contract Code Section 7102 may apply to changes in the Work or delays under this contract, the actual delays and damages, if any, and time extensions are intended to, and shall provide, the exclusive and full method of compensation for changes in the Work and construction delays.

8.4.3 Notice by Contractor Required.

The Contractor shall within five (5) calendar days of beginning of any such delay notify the District in writing of causes of delay with justification and supporting documentation. District will then ascertain the facts and extent of the delay and grant an extension of time for completing the Work when, in its judgment, the findings of fact justify such an extension. Extensions of time shall apply only to that portion of the Work affected by the delay and shall not apply to other portions of the Work not so affected. The sole remedy of Contractor for extensions of time under Paragraph 8.4.2 shall be an extension of the Contract Time at no cost to the District.

Claims relating to time extensions shall be made in accordance with applicable provisions of Article 7.

8.4.4 No Additional Compensation for Delays within Contractor’s Control

CONTRACTOR IS AWARE THAT GOVERNMENTAL AGENCIES, SUCH AS THE DEPARTMENT OF GENERAL SERVICES, GAS COMPANIES, ELECTRICAL UTILITY COMPANIES, WATER DISTRICTS AND OTHER AGENCIES MAY HAVE TO APPROVE CONTRACTOR PREPARED DRAWINGS OR APPROVE A PROPOSED INSTALLATION. CONTRACTOR HAS INCLUDED DELAYS AND DAMAGES WHICH MAY BE CAUSED BY SUCH AGENCIES IN CONTRACTOR’S BID. THUS, CONTRACTOR IS NOT ENTITLED TO MAKE CLAIM UPON THE DISTRICT FOR DAMAGES OR DELAYS ARISING FROM THE DELAYS CAUSED BY SUCH AGENCIES. FURTHERMORE, THE CONTRACTOR HAS SCHEDULED FOR SUCH DELAYS AND IS NOT ENTITLED TO AN EXTENSION OF TIME FOR DELAYS CAUSED BY GOVERNMENTAL AGENCIES WHICH CONTRACTOR MUST OBTAIN APPROVALS FROM AND, THUS, CONTRACTOR IS NOT ENTITLED TO AN EXTENSION OF TIME.

CONTRACTOR SHALL ONLY BE ENTITLED TO COMPENSATION FOR DELAY WHEN THE FOLLOWING CONDITIONS ARE MET: (1) THE DISTRICT IS RESPONSIBLE FOR THE DELAY; (2) THE DELAY IS UNREASONABLE UNDER THE CIRCUMSTANCES INVOLVED; AND (3) THE DELAY WAS NOT WITHIN THE CONTEMPLATION OF DISTRICT AND CONTRACTOR.
ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

9.2 COST BREAKDOWN

9.2.1 Required Information.

On forms or software programs (e.g., Microsoft Project, Primavera or Excel) approved by the District, the Contractor shall furnish the following:

(a) Within ten (10) days of the award of the Contract, a detailed breakdown of the Contract Sum (hereinafter “Schedule of Values” or “SOV”) for each Project or Site;

(b) Within ten (10) days of the award of the Contract, a schedule of estimated monthly payment requests due the Contractor showing the values and construction time of the various portions of the Work to be performed by it and by its Subcontractors or material and equipment suppliers containing such supporting evidence as to its correctness as the District may require;

(c) Within ten (10) days of the award of the Contract, the name, address, telephone number, telecopier number, California State Contractors License number, classification and monetary value of all Subcontracts for parties furnishing labor, material, or equipment for completion of the Project.

9.2.2 District Approval Required.

The District shall review all submissions received pursuant to Paragraph 9.2.1 in a timely manner. All submissions must be approved by the District before becoming the basis of any payment. Contractor may request to District representation, prior to submission, to submit information required by paragraph 9.2.1 in a spreadsheet (Microsoft Excel) format. Approval of an alternate format is entirely at District’s discretion.

9.3 PROGRESS PAYMENTS

9.3.1 Payments to Contractor.

Within thirty (30) days after approval of the Request for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as certified by Architect and Inspector and verified by Contractor) up to the last day of the previous month, less the aggregate of previous payments. The value of the Work completed shall be Contractor’s best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any surety upon any bond, from damages arising from such Work, or from the District’s enforcement of each and every
provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for work performed, so long as any lawful or proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

The SOV items of Work shall include a prorated portion of Contractor's home office and field office overhead, profit, insurance, (except to the extent expressly identified in a Proposal Item) and/or other financing, as well as General Conditions costs, (e.g., routine time related Site cleanup and maintenance, temporary power and lighting, security, temporary trailer rental, temporary fence rentals, and the like). The SOV shall also not include separate line items to prepare submittals, or other Work items not at the Project Site, unless expressly identified in these Contract Documents as specific exceptions.

Costs for each item of Work at the Project site shall be indicated on a single line that breaks out labor, materials, and equipment for that item of Work, with all items noted in the paragraph above prorated into each line. Unless otherwise allowed, the SOV shall reflect that the District shall only pay for installed items of Work at the Project site. All other costs shall be prorated through all activities and all Phases of the Project so that the sum of all Schedule of Values line items equals the total Contract Sum.

Notwithstanding anything to the contrary stated above, the Contractor may include in its Request for Payment the value of any fabricated structural steel, mail order materials, G.F.R.C. panels and other such custom-made materials prepared specifically for the Project and unique to the Project so long as all of the following requirements are satisfied:

(a) No payment shall be made for materials stored off-site without the written approval of the District to be given or withheld in the District's sole discretion;

(b) Title to such materials shall be vested in the District as evidenced by documentation satisfactory in form and substance to the District, including, without limitation, recorded financing statements, UCC filings and UCC searches;

(c) With each Contractor Request for Payment, the Contractor shall submit to the District a written list identifying each location where materials are stored off-site (which must be a bonded warehouse) and the value of the materials at each location. The Contractor shall procure insurance satisfactory to the District (in its reasonable discretion) for materials stored off-site in an amount not less than the total value thereof;

(d) The consent of any Surety shall be obtained to the extent required prior to payment for any materials stored off-site;

(e) Representatives of the District shall have the right to make inspections of the storage areas at any time; and

(f) Such materials shall be (1) protected from diversion, destruction, theft and damage to the reasonable satisfaction of the District; (2) specifically marked for use on the Project; and (3) segregated from other materials at the storage facility.
9.3.2 Purchase of Materials and Equipment.

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.

9.3.3 No Waiver.

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct any error subsequent to any payment.

9.3.4 Issuance of Certificate of Payment.

The Architect shall, within seven (7) days after receipt of the Contractor's Application for Payment, either approve such payment or notify the Contractor in writing of the Architect's reasons for withholding approval in whole or in part as provided in Paragraph 9.6. The review of the Contractor's Application for Payment by the Architect is based on the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to (1) an evaluation of the Work for conformance with the Contract Documents, (2) results of subsequent tests and inspections, (3) minor deviations from the Contract Documents correctable prior to completion, and (4) specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified.

9.4 APPLICATIONS FOR PROGRESS PAYMENTS

9.4.1 Procedure.

9.4.1.1 Application for Progress. On or before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the Architect an itemized Application for Progress Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or such portion thereof as Architect requires:

(a) The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

(b) The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

(c) The balance that will be due to each of such entities after said payment is made;
(d) A certification that the Record Drawings and Annotated Specifications are current;
(e) Itemized breakdown of work done for the purpose of requesting partial payment;
(f) An updated construction schedule in conformance with Paragraph 3.8;
(g) The additions to and subtractions from the Contract Sum and Contract Time;
(h) A summary of the retentions held;
(i) Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;
(j) The percentage of completion of the Contractor’s Work by line item; and
(k) An updated Schedule of Values from the preceding Application for Payment.

9.4.2 Prerequisites for Progress Payments.

9.4.2.1 First Payment Request. The following items, if applicable, must be completed before the first payment request will be accepted for processing:

(a) Installation of the Project sign;
(b) Receipt by Architect of submittals;
(c) Installation of field office;
(d) Installation of temporary facilities and fencing;
(e) Submission of documents listed in the Paragraph 9.2 relating to Cost Breakdown;
(f) Contractor’s Construction Schedule (Schedule to be CPM based in conformance with Paragraph 3.8);
(g) Schedule of unit prices;
(h) Submittal Schedule;
(i) Copies of necessary permits;
(j) Copies of authorizations and licenses from governing authorities;
(k) Initial progress report;
(l) Surveyor qualifications;
(m) Written acceptance of District’s survey of rough grading;
(n) List of all subcontractors, with names, license numbers, telephone numbers, and scope of work;
(o) All bonds and insurance endorsements; and
(p) Resumes of General Contractor’s Project Manager and superintendent.
9.4.2.2  **All Payment Requests.** No payment requests will be processed unless Contractor has submitted copies of the Certified Payroll records for the Work which correlates to the payment request and a proper CPM schedule pursuant to Paragraph 3.8 is submitted.

9.4.2.3  Any payments made to Contractor where criteria set forth in Paragraph 9.4.2.1 or 9.4.2.2 have not been met shall not constitute a waiver of said criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers and that Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

**9.5 WARRANTY OF TITLE**

The Contractor warrants title to all work. The Contractor further warrants that all work is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work. Failure to keep work free of liens, claims, security interests or encumbrances is grounds to make a claim against Contractor’s payment and performance bond to immediately remedy and defend.

If a lien or stop notice of any nature should at any time be filed against the Work or any District property, by any entity which has supplied material or services at the request of the Contractor, Contractor and Contractor’s surety shall promptly, on demand by District and at Contractor’s and surety’s own expense, take any and all action necessary to cause any such lien or stop notice to be released or discharged immediately therefrom.

If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or stop notice has been so released, discharged, or secured, then District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney’s fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

**9.6 DECISIONS TO WITHHOLD PAYMENT**

9.6.1  **Reasons to Withhold Payment.**

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District’s opinion, the representations to the District required by Paragraph 9.4 cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to:

(a)  Defective Work not remedied;
(b)  Stop Notices served upon the District;
(c)  Liquidated damages assessed against the Contractor;
(d)  The cost of completion of the Contract if there exists reasonable doubt that the Work can be completed for the unpaid balance of any Contract Sum or by the completion date;
(e)  Damage to the District or other contractor;
(f) Unsatisfactory prosecution of the Work by the Contractor;

(g) Failure to store and properly secure materials;

(h) Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, acceptable monthly progress schedules, shop drawings, submittal schedules, schedule of values, product data and samples, proposed product lists, executed Construction Change Directives, and verified reports;

(i) Failure of the Contractor to maintain record drawings;

(j) Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment;

(k) Unauthorized deviations from the Contract Documents;

(l) Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and completion dates.

(m) Failure to properly pay prevailing wages as defined in Labor Code section 1720, et seq.;

(n) Failure to properly maintain or clean up the Site;

(o) Payments to indemnify, defend, or hold harmless the District;

(p) Any payments due to the District including but not limited to payments for failed tests, or utilities changes or permits;

(q) Failure to submit an acceptable schedule in accordance with Paragraph 3.8; or

(r) Failure to pay Subcontractor or suppliers as required by Paragraph 9.8.1.

9.6.2 Reallocation of Withheld Amounts.

District may, in its discretion, apply any withheld amount to payment of outstanding claims or obligations as defined in Paragraphs 9.6.1 and 9.5. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then such amount shall be considered as a payment made under Contract by District to Contractor and District shall not be liable to Contractor for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of such funds disbursed on behalf of Contractor.

If Contractor defaults or neglects to carry out the Work in accordance with the contract documents or fails to perform any provision thereof, District may, after ten (10) calendar days written notice to the Contractor and without prejudice to any other remedy make good such deficiencies. The District shall adjust the total Contract price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work which is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract price (of at least 150% of the estimated reasonable value of the nonconforming work) shall be made therefor.
9.6.3 Payment After Cure.

When the grounds for declining approval are removed, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

9.7 NONCONFORMING WORK

Contractor shall promptly remove from premises all Work identified by District as failing to conform to the Contract whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract without additional expense to District and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

If Contractor does not remove such Work which has been identified by District as failing to conform to the Contract Documents within a reasonable time, fixed by written notice, District may remove it and may store the material at Contractor’s expense. If Contractor does not pay expenses of such removal within ten (10) calendar days’ time thereafter, District may, upon ten (10) calendar days’ written notice, sell such materials at auction or at private sale and shall account for net proceeds thereof, after deducting all costs and expenses that should have been borne by Contractor.

9.8 SUBCONTRACTOR PAYMENTS

9.8.1 Payments to Subcontractors.

No later than ten (10) days after receipt, or pursuant to Business and Professions Code Section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor’s portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

9.8.2 No Obligation of District for Subcontractor Payment.

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

9.8.3 Payment Not Constituting Approval or Acceptance.

An approved Request for Payment, a progress payment, or partial or entire use or occupancy of the Project by the District shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.8.4 Joint Checks.

District shall have the right, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any
such joint payment. In no event shall any joint check payment be construed to create any contract between the District and a Subcontractor of any tier, any obligation from the District to such Subcontractor, or rights in such Subcontractor against the District.

9.9 PROJECT RECORD DOCUMENTS

This section includes administrative and procedural requirements for Project Record Documents, including but not limited to the following where applicable:

9.9.1 Record Drawings
9.9.2 Record Specifications
9.9.3 Record Product Data
9.9.4 Record MEP & Structural coordination documents
9.9.5 Project Record Documents include, but are not limited to, the following:
   9.9.5.1 Marked-up copies of Drawings
   9.9.5.2 Marked up copy of the Project Specifications
   9.9.5.3 Marked-up copies of Shop Drawings
   9.9.5.4 Newly prepared Drawings and Specifications
   9.9.5.5 Marked-up Product Data submittals
   9.9.5.6 Field records, such as photographs, for variable and concealed conditions
   9.9.5.7 Record information for Work that is only schematically shown
   9.9.5.8 Maintenance forms for equipment

Contractor shall dedicate one complete full size set of the Contract Drawings and one complete Project Manual for use in recording as-built conditions.

Contractor shall submit to District in hard copy one original and two copies of all Project Record Documents. In addition, one electronic copy in electronic media format shall be submitted to District. District reserves the right to require resubmittal in accordance with these General Conditions if the documents are inaccurate or incomplete, or otherwise fail to meet the requirements of these Contract Documents.

9.9.6 Project Record Drawings

Mark-up Procedure: During the construction period, maintain a complete, current set of full size blackline prints of Contract Drawings and Shop Drawings for Project Record Documents purposes. Label each document (on first sheet or format page) "Project Record" in 2-inch high printed letters. Keep all record documents current.

A reference by number to a Change Order, CCD, RFI, RFO, RFP, Field Order or other such document is not acceptable as sufficient record information on any record document. Do not conceal any Work until required record information has been recorded.
Contractor shall mark Record Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to:

9.9.6.1 Dimensional changes to the Contract Drawings (horizontal and/or vertical)

9.9.6.2 Revisions or any modification to details shown on the Contract Drawings

9.9.6.3 Depths of various elements of foundations in relation to main floor level or survey datum.

9.9.6.4 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

9.9.6.5 Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.

9.9.6.6 Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stub outs, invert elevations and similar items

9.9.6.7 Final, actual numbering of each electrical circuit

9.9.6.8 Revisions to routing of piping and conduits

9.9.6.9 Revisions to electrical circuitry

9.9.6.10 Actual equipment locations

9.9.6.11 Duct size and routing

9.9.6.12 Changes made by Change Order, CCD, ASI, or any other directive

9.9.6.13 Details not on original Contract Drawings

Contractor shall mark completely and accurately Project Record Drawing prints of Contract Drawings or Shop Drawings, whichever is the most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.

Contractor shall mark Project Record Drawing sets with red, erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.

Contractor shall be responsible for Mark-up: Where feasible, the individual or entity who obtained Project Record Drawing data, whether the individual or entity is the installer, Subcontractor or similar entity, is required to prepare the mark-up on Project Record Drawings. Contractor shall prepare Record Drawings: Immediately prior to inspection for Certification of Substantial Completion of the Work, review completed marked-up Project Record Drawings with District, Project Inspector, Construction Manager, and Architect to ensure accuracy of information. Once accuracy of information is confirmed, prepare and submit a full set of as-built Contract Drawings and Shop Drawings.
Incorporate changes and additional information previously marked on print sets. Delete, redraw, and/or add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWING" and the date prepared in a prominent location on each Drawing.

Distribution: Whether or not changes and additional information were recorded, organize and bind original marked-up set of prints that were maintained during the construction period into manageable sets. Bind the set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets and submit to District.

9.9.7 Project Record Specification

Contractor shall, during the construction period, maintain one copy of the Project Specifications, including all addenda and all other modifications issued for Project Record Documents purposes.

Contractor shall mark the Project Record specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and/or modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, Change Order and Construction Change Directive Work, and information on concealed installation that would be difficult to identify, measure, and record later.

9.9.8 Project Record Product Data

Contractor shall, during the construction period, maintain one copy of each Project Record Product Data submittal for "Project Record Document" purposes.

Contractor shall arrange Project Record Product Data by Specification Section number, and provide names, addresses, fax numbers, emails addresses, and telephone number of Subcontractors and suppliers. Information to be provided includes:

9.9.8.1 Trade Names
9.9.8.2 Model or type numbers
9.9.8.3 Assembly diagrams
9.9.8.4 Operating instructions
9.9.8.5 Cleaning instructions
9.9.8.6 Maintenance instructions
9.9.8.7 Recommended spare parts
9.9.8.8 Product data

9.9.9 Miscellaneous Project Record Submittals

Refer to other Specification Sections for miscellaneous record keeping requirements and submittals. Immediately prior to Substantial Completion of the Work complete miscellaneous records and place in good order, properly identified, ready for use and reference. Submit to the District for District's records, in Adobe PDF format.
9.9.10 Electronic Media Format

Electronic Media Format: Electronic media format for all Project Record Documents shall be Adobe PDF, with chapter markers and/or bookmarks inserted in place of the equivalent hard copy section tabs. Electronic copy shall include all tables, charts, drawings, codes and all other matters reflected in hard copies. Electronic media files shall be delivered on a unique CD-ROM or flash drive.

9.10 COMPLETION OF THE WORK

9.10.1 Contract Closeout Submittals include, but are not limited to:

9.10.1.1 Electronic Media of All Project Record Documents described in Article 9.9.10 above.
9.10.1.2 Record Samples
9.10.1.3 Field records for variable and concealed conditions
9.10.1.4 Operating and maintenance manuals and data
9.10.1.5 Warranties, guaranties, and bonds
9.10.1.6 Warranty Tags
9.10.1.7 Spare Parts Data
9.10.1.8 Service and maintenance contracts
9.10.1.9 Certified and approved fire inspection documents, when required

9.10.2 Initial Punch List and Inspection

When Contractor considers Work to be Substantially Complete, submit written notice to District’s Representative requesting an initial Inspection and listing items remaining to be completed or corrected listed by room number and item number (hereinafter “Initial Punch List”). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the list without waiting for District review of the Initial Punch List and inspection of the Work. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The Contractor shall not submit a notice requesting an Initial Inspection unless the Work is Substantially Complete.

9.10.2.1 Before calling for final inspection, Contractor shall determine that the following Work has been performed:

a. The Work has been completed.
b. All life safety items are completed and in working order.
c. Mechanical and electrical Work complete, fixtures in place, connected and ready for tryout and test.
d. Electrical circuits scheduled in panels and disconnect switches labeled.
e. Painting and special finishes complete.
f. Doors complete with hardware, cleaned of protective film relieved of
sticking or binding and in working order.

g. Tops and bottoms of doors sealed.
h. Floors waxed and polished as specified.
i. Broken glass replaced and glass cleaned.
j. Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.
k. Work cleaned, free of stains, scratches, and other foreign matter, replacement of damaged and broken material.
l. Finished and decorative work shall have marks, dirt and superfluous labels removed.
m. Final cleanup.

9.10.2.2 Furnish a letter to District stating that a responsible representative of District [give name and position] has been instructed in working characteristics of mechanical and electrical equipment.

Should District's Representatives determine that Work is not Substantially Complete, the Architect or Construction Manager will promptly notify Contractor in writing, listing Work that must be completed prior to Substantial Completion. Any inspection list that is submitted to the District that does not result in a District determination of Substantial Completion will not be considered an accepted Initial Punch List. If the Work or Phase of Work is determined to not be Substantially Complete, Contractor shall complete all Work as directed prior to requesting an additional Initial Inspection by the District to determine Substantial Completion per this Specification Section.

Upon receipt of the Contractor's Initial Punch List, and not before, the Architect, Construction Manager, and Inspector will make an Initial Inspection to determine whether the Work, or Phase of Work, is Substantially Complete.

9.10.2.3 All fire and life safety items, manufactured units, equipment and systems that require startup must have been started, run, tested, and operational for periods prescribed by the Contract Documents before a request for Initial Inspection is accepted by the District.

9.10.2.4 If additional Initial Inspections are required to review Initial Punch List items due to incompleteness of the Work by Contractor, Contractor will reimburse District for all costs associated with these inspections if additional services fees by District consultants are required. The costs of such District additional service fees will be deducted from the Contract Sum by Change Order.

9.10.3 Substantial Completion

When District determines that the Work is Substantially Complete, District will issue a Certificate of Substantial Completion, accompanied by Final Punch List of items to be completed or corrected as verified and/or appended by Architect and District.

When the Work is Substantially Complete, the District will file a Notice of Completion.

9.10.3.1 Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work unless otherwise provided in the Notice of Completion.
9.10.3.2 The Notice of Completion shall be submitted to the Contractor for their written acceptance of responsibilities assigned to them in such Notice prior to District filing the Notice of Completion for purposes of initiating the release of Retention for the Work or Phase of Work.

9.10.3.3 The District shall withhold from Contractor payment the value of remaining Work, Work to be corrected, incomplete Work, and an amount identified for Punch List Work, and as otherwise identified in Public Contract Code.

The Contractor shall complete the items listed in the Final Punch List within ten (10) working days of the Certificate of Substantial Completion. The Contractor shall execute the Work such that the District can occupy the Work within seven (7) calendar days of the date of the Certificate of Substantial Completion.

9.10.4 Final Inspection

When Contractor considers the items listed in the Final Punch List to be complete the Contractor shall submit written notice to District’s Representative requesting a Final Inspection.

Operations and Maintenance Manuals and Warranty and Guaranty documents. At least ten (10) days prior to final inspection, three (3) copies of complete operations and maintenance manuals, repair parts lists, service instructions for all electrical and mechanical equipment, and equipment warranties shall be submitted. All installation, operating, and maintenance information and drawings shall be bound in 8½” x 11” binders. Provide a table of contents in front and all items shall be indexed with tabs. Each manual shall also contain a list of subcontractors, with their addresses and the names of persons to contact in cases of emergency. Identifying labels shall provide names of manufacturers, their addresses, ratings, and capacities of equipment and machinery. Additional requirements for Operations and Maintenance manuals may be found in other Specifications and Sections of the Contract Documents.

Upon receipt of the Contractor’s request for Final Inspection, and not before, the Contractor, Architect, and Construction Manager, shall meet to go over the Contract Documents to identify the administrative requirements for contract close-out.

9.10.4.1 The Construction Manager will prepare a list of requirements remaining for administrative close-out and shall provide the list to the Contractor. This list may be general in nature, and shall not serve to relieve the Contractor from any of the administrative requirements of the Contract.

9.10.4.2 The Contractor shall complete all items on the administrative close-out list within twenty-one (21) days

Subsequent to the meeting to identify administrative close-out requirements, Architect, Construction Manager, Campus Representatives, and Inspector will inspect the Work to determine whether the Work identified on the Final Punch List is complete.

If additional Final Inspections are required to review the Final Punch List items due to incompleteness of the Work by Contractor, Contractor will reimburse District for all costs associated with these inspections if additional services fees by District consultants are required. The costs of such District additional service fees will be deducted from the Contract Sum by Change Order.
When the Architect determines that all final punch list items have been completed, a final Project Inspection Report will be issued. Any outstanding administrative close-out requirements will be identified and a value for withholding from Progress Payment or Final Payment will be assigned.

The Project Inspector (IOR), the Construction Manager, and the Contractor shall, at all times, be together during all inspections. The Contractor shall give 24-hour notice to the District for such inspections.

9.10.5 Final Completion

Final Completion occurs when all Work meets all requirements of the Contract Documents. When Contractor considers all Work complete and all close-out requirements have been performed, submitted, and accepted, submit written certification to District that:

9.10.5.1 Contractor has inspected Work for compliance with Contract Documents, and all requirements for Final Acceptance have been met.

9.10.5.2 Except for Contractor maintenance and Deferred or Seasonal Testing, after Final Acceptance, all Work has been completed in accordance with Contract Documents and deficiencies listed with any Certificate of Substantial Completion have been corrected. Equipment and systems have been tested in the presence of Architect, Project Inspector (IOR), Construction Manager, and District Representatives and are operative.

Should District determine that the Work is incomplete or defective or that administrative requirements have not been completed:

9.10.5.3 District’s Representative promptly will so notify Contractor, in writing, listing the incomplete or defective items.

9.10.5.4 Contractor shall promptly remedy all incomplete and/or defective Work and notify the District when it is ready for re-inspection. District’s Representatives will then re-inspect the Work. If deficiencies previously noted are found not to be corrected, Contractor shall pay all District costs for the re-inspection.

9.10.5.5 When District determines that all Work and requirements are complete under the Contract Documents, District or Construction Manager will request Contractor to make a request for Final Payment.

9.11 PARTIAL OCCUPANCY OR USE

9.11.1 District’s Rights.

The District may occupy or use any completed or partially completed portion of the Work at any stage. The District and the Contractor shall agree in writing to the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents. If District and Contractor cannot agree as to responsibilities such disagreement shall be resolved pursuant to Paragraph 4.5.1. When the Contractor considers a portion complete, the Contractor shall prepare and submit a Punch List to the District as provided under Paragraph 9.9.1.
9.11.2 Inspection Prior to Occupancy or Use.

Immediately prior to such partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.11.3 No Waiver.

Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of the Work not complying with the requirements of the Contract Documents.

9.12 COMPLETION AND FINAL PAYMENT

9.12.1 Final Inspection.

Contractor shall comply with all Punch List and Inspection procedures under Paragraph 9.10.

Upon receipt and approval of such final Application for Payment as required in Article 9.10.5.5 and elsewhere, the Architect shall issue a final Certificate of Payment stating that to the best of its knowledge, information, and belief, and on the basis of its observations, inspections, and all other data accumulated or received by the Architect in connection with the Work, such Work has been completed in accordance with the Contract Documents. The District shall thereupon inspect such Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon acceptance of the Work of the Contractor as fully complete (which, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of payment from the District, pay the amounts due Subcontractors.

9.12.2 Retainage.

The retainage, less any amounts disputed by the District or of which the District has the right to withhold Pursuant to Paragraph 9.6, shall be paid after approval of the District by the Architect's Certificate of Payment, after the satisfaction of the conditions set forth in Article 9, and after thirty-five (35) days after the acceptance of the Work and recording of the Notice of Completion by District. No interest shall be paid on any retainage, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code § 22300.

9.12.3 Procedures for Application for Final Payment.

9.12.3.1 Prerequisites for Final Payment. The following conditions must be fulfilled prior to Final Payment:

(a) A full and final waiver or release of all Stop Notices in connection with the Work shall be submitted by Contractor, including a release of Stop Notice in recordable form, together with (to the extent permitted by law) a copy of the full and final release of all Stop Notice rights.
(b) The Contractor shall have made all corrections to the Work which are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

(c) Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

(d) Contractor must have completed all requirements set forth in Paragraph 9.9.1.2.

(e) Architect shall have issued a Final Certificate of Payment.

(f) The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents.

(g) The Contractor shall have completed final clean up as required by Paragraph 3.12.

9.13 SUBSTITUTION OF SECURITIES

The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 Contractor Responsibility.

The Contractor is constructive owner of Project site. The Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance by the District. All work shall be solely at the Contractor’s risk, with the exception of damage to the work caused by “acts of God” as defined in Public Contract Code Section 7105(b)(2).

Contractor shall take, and require subcontractor to take, all necessary precautions for safety of workers on the Work and shall comply with all applicable federal, state, local and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. In addition to meeting all requirements of OSHA, Cal-OSHA, state, and local codes, Contractor shall furnish, erect and properly maintain at all times, as directed by District or Architect or required by conditions and progress of work, all necessary safety devices, safeguards, construction canopies, signs, audible devices for protection of the blind, safety rails, belts and nets, barriers, lights, and watchmen for protection of workers and the public, and shall post danger signs warning against hazards created by such features in the course of construction. Contractor shall designate a responsible
member of its organization on the Work, whose duty shall be to post information regarding protection
and obligations of workers and other notices required under occupational safety and health laws, to
comply with reporting and other occupational safety requirements, and to protect the life, safety and
health of workers. The name and position of person so designated shall be reported to District by
Contractor. Contractor shall correct any violations of safety laws, rules, orders, standards, or
regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety
and Health, such violation shall be corrected promptly.

The Contractor and Subcontractors shall continuously protect the Work, the District’s property,
and the property of others, from damage, injury, or loss arising in connection with operations under the
Contract Documents. The Contractor and Subcontractors, at their own expense, shall make good any
such damage, injury, or loss, except such as may be solely due to, or caused by, agents or employees of
the District.

10.1.2 Subcontractor Responsibility.

Contractor shall require that Subcontractors participate in, and enforce, the safety and loss
prevention programs established by the Contractor for the Project, which will cover all Work performed
by the Contractor and its Subcontractors. Each Subcontractor shall designate a responsible member of
its organization whose duties shall include loss and accident prevention, and who shall have the
responsibility and full authority to enforce the program. This person shall attend meetings with the
representatives of the various Subcontractors employed to ensure that all employees understand and
comply with the programs.

10.1.3 Cooperation.

All Subcontractors and material or equipment suppliers, shall cooperate fully with Contractor,
the District, and all insurance carriers and loss prevention engineers.

10.1.4 Accident Reports.

Subcontractors shall immediately, within two (2) days, report in writing to the Contractor all
accidents whatsoever arising out of, or in connection with, the performance of the Work, whether on or
off the Site, which caused death, personal injury, or property damage, giving full details and statements
of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall
be reported within four (4) days by telephone or messenger. Contractor shall thereafter immediately,
within two (2) days, report the facts in writing to the District and the Architect giving full details of the
accident.

10.1.5 First-Aid Supplies at Site.

The Contractor will provide and maintain at the Site first-aid supplies which complies with the
current Occupational Safety and Health Regulations.

10.1.6 Material Safety Data Sheets and Compliance with Proposition 65.

(a) Contractor is required to have material safety data sheets available in a
readily accessible place at the job site for any material requiring a material safety
data sheet per the Federal “hazard communication” standard, or employees’ “right-
to-know law.” The Contractor is also required to properly label any substance brought into the job site, and require that any person working with the material, or within the general area of the material, is informed of the hazards of the substance and follows proper handling and protection procedures.

Contractor is required to comply with the provisions of California Health and Safety Code section 25249, et seq., which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer. The Contractor agrees to familiarize itself with the provisions of this section, and to comply fully with its requirements.

10.1.7 Non-Utilization of Asbestos Material.

NO ASBESTOS OR ASBESTOS-CONTAINING PRODUCTS SHALL BE USED IN THIS CONSTRUCTION OR IN ANY TOOLS, DEVICES, CLOTHING, OR EQUIPMENT USED TO EFFECT THIS CONSTRUCTION.

Asbestos and/or asbestos-containing products shall be defined as all items containing, but not limited to, chrysotile, amosite, anthophyllite, tremolite, and actinolite.

Any or all material containing greater than one-tenth of one percent (> .1%) asbestos shall be defined as asbestos-containing material.

All Work or materials found to contain asbestos or Work or material installed with asbestos-containing equipment will be immediately rejected and this Work will be removed at no additional cost to the District.

Decontamination and removal of Work found to contain asbestos or Work installed with asbestos-containing equipment shall be done only under supervision of a qualified consultant, knowledgeable in the field of asbestos abatement and accredited by the Environmental Protection Agency.

The asbestos removal contractor shall be an EPA accredited contractor qualified in the removal of asbestos and shall be chosen and approved by the asbestos consultant, who shall have sole discretion and final determination in this matter.

The asbestos consultant shall be chosen and approved by the District, who shall have sole discretion and final determination in this matter.

The Work will not be accepted until asbestos contamination is reduced to levels deemed acceptable by the asbestos consultant.

Interface of Work under this Contract with work containing asbestos shall be executed by the Contractor at his risk and at his discretion, with full knowledge of the currently accepted standards, hazards, risks, and liabilities associated with asbestos work and asbestos-containing products. By execution of this Contract, the Contractor acknowledges the above and agrees to hold harmless District and its assigns for all asbestos liability which may be associated with this work and agrees to instruct his employees with respect to the above-mentioned standards, hazards, risks, and liabilities.
10.2 **SAFETY OF PERSONS AND PROPERTY**

10.2.1 The Contractor.

The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:

(a) Employees on the Work and other persons who may be affected thereby;

(b) The Work, material, and equipment to be incorporated therein, whether in storage on or off the Site, under the care, custody, or control of the Contractor or the Contractor’s Subcontractors or Sub-subcontractors; and

(c) Other property at the Site or adjacent thereto such as trees, shrubs, lawns, walks, pavement, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

Contractor is constructive owner of Project site as more fully discussed in Paragraph 6.2.

10.2.2 Contractor Notices.

The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on the safety of persons or property or their protection from damage, injury, or loss.

10.2.3 Safety Barriers and Safeguards.

The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

10.2.4 Use or Storage of Hazardous Material.

When use or storage of explosives, other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. The Contractor shall notify the District any time that explosives or hazardous materials are expected to be stored on Site. Location of storage shall be coordinated with the District and local fire authorities.

10.2.5 Protection of Work.

The Contractor and Subcontractors shall continuously protect the Work, the District’s property, and the property of others, from damage, injury, or loss arising in connection with operations under the Contract Documents. The Contractor and Subcontractors, at their own expense, shall make good any such damage, injury, or loss, except such as may be solely due to, or caused by, agents or employees of the District.

The Contractor, at Contractor’s expense, will remove all mud, water, or other elements as may be required for the proper protection and prosecution of its Work.
Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations. All permits, licenses, or inspection fees required for such repair Work shall be obtained and paid for by Contractor.

10.2.6 Requirements for Existing Sites.

Contractor shall (unless waived by the District in writing):

(a) When performing construction on existing sites, become informed and take into specific account the maturity of the students on the Site; and perform Work which may interfere with campus routine before or after campus hours, enclose working area with a substantial barricade, and arrange Work to cause a minimum amount of inconvenience and danger to students and faculty in their regular campus activities. The Contractor shall comply with specifications and directives of the District regarding the timing of certain construction activities in order to avoid unnecessary interference with the campus’ functions.

(b) Provide substantial barricades around any shrubs or trees indicated to be preserved.

(c) Deliver materials to building area over route designated by Architect.

(d) Take preventive measures to eliminate objectionable dust, noise, or other disturbances.

(e) Confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits or directions of Architect; and not interfere with the Work or unreasonably encumber premises or overload any structure with materials; and enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking and require that all workers comply with all regulations while on the Project site.

(f) Take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed by accident, they shall be replaced by an approved land surveyor or civil engineer and all maps and records required therefrom shall be filed with county and local authorities, at no cost to the District. All filing and plan check fees shall be paid by Contractor.

(g) Provide District on request with Contractor’s written safety program and safety plan for each site.

10.2.7 Shoring and Structural Loading.

The Contractor shall not impose structural loading upon any part of the Work under construction or upon existing construction on or adjacent to the Site in excess of safe limits, or loading such as to result in damage to the structural, architectural, mechanical, electrical, or other components of the Work. The design of all temporary construction equipment and appliances used in construction of the Work and not a permanent part thereof, including, without limitation, hoisting equipment, cribbing, shoring, and temporary bracing of structural steel, is the sole responsibility of the Contractor.
All such items shall conform with the requirements of governing codes and all laws, ordinances, rules, regulations, and orders of all authorities having jurisdiction. The Contractor shall take special precautions, such as shoring of masonry walls and temporary tie-bracing of structural steel work, to prevent possible wind damage during construction of the Work. The installation of such bracing or shoring shall not damage the Work in place or the Work installed by others. Any damage which does occur shall be promptly repaired by the Contractor at no cost to the District.

10.2.8 Conformance Within Established Limits.

The Contractor and Subcontractors shall confine their construction equipment, the storage of materials, and the operations of workers to the limits indicated by laws, ordinances, permits, and the limits established by the District or the Contractor, and shall not unreasonably encumber the premises with construction equipment or materials.

10.2.9 Subcontractor Enforcement of Rules.

Subcontractors shall enforce the District’s and the Contractor’s instructions, laws, and regulations regarding signs, advertisements, fires, smoking, the presence of liquor, and the presence of firearms by any person at the Site.

10.2.10 Site Access.

The Contractor and the Subcontractors shall use only those ingress and egress routes designated by the District, observe the boundaries of the Site designated by the District, park only in those areas designated by the District, which areas may be on or off the Site, and comply with any parking control program established by the District, such as furnishing license plate information and placing identifying stickers on vehicles.

10.3 EMERGENCIES

10.3.1 Emergency Action.

In an emergency affecting the safety of persons or property, the Contractor shall take any action necessary, at the Contractor’s discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 7.

10.3.2 Accident Reports.

The Contractor shall promptly report in writing to the District all accidents arising out of or in connection with the Work, which caused death, personal injury, or property damage, giving full details and statements of any witnesses in conformance with Article 10.1.4. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported in accordance with Paragraph 10.1.4, immediately by telephone or messenger to the District.
10.4 HAZARDOUS MATERIALS

10.4.1 Discovery of Hazardous Materials.

In the event the Contractor encounters or suspects the presence on the job site of material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or any other material defined as being hazardous by § 25249.5 of the California Health and Safety Code, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the District and the Architect in writing, whether or not such material was generated by the Contractor or the District. The Work in the affected area shall not thereafter be resumed, except by written agreement of the District and the Contractor, if in fact the material is asbestos, polychlorinated biphenyl (PCB), or other hazardous material, and has not been rendered harmless. The Work in the affected area shall be resumed only in the absence of asbestos, polychlorinated biphenyl (PCB), or other hazardous material, or when it has been rendered harmless by written agreement of the District and the Contractor.

If hazardous materials are encountered, they shall be handled in accordance with applicable local, state and federal regulation which may include: (1) CCR Title 8, Division 4, Chapter 4, Sections 5163 through 5167 and 5192 (Hazardous Waste Operations and Emergency Response); (2) CCR Title 22, Division 4.5, Chapters 10 through 13 and 18 (Environmental Health Standards for Management of Hazardous Waste); and (3) CCR Title 23, Division 3, Chapter 15 (Discharges of Hazardous Waste to Land).

Should the discovery of contaminants cause delay to Contractor's operation, extension of Contract Time will be granted by District in accordance with these General Conditions. Contractor may not be entitled to damages or additional payment due to such delays. District may, if it believes appropriate in its sole discretion, grant an extension of Contract Time.

The Contractor shall take all measures to avoid and/or mitigate delays due to Hazardous Materials/Waste finds such as; avoiding the area of the find and proceeding with other work on the project; developing “work around” plans; and documenting his best efforts to avoid and/or mitigate delays.

10.4.2 Hazardous Material Work Limitations.

In the event that the presence of hazardous materials is suspected or discovered on the Site (except in cases where asbestos and other hazardous material work in the Contractor’s responsibility), the District shall retain an independent testing laboratory to determine the nature of the material encountered and whether corrective measures or remedial action is required. The Contractor shall not be required pursuant to Article 7 to perform without consent any Work in the affected area of the Site relating to asbestos, polychlorinated biphenyl (PCB), or other hazardous material, until any known or suspected hazardous material has been removed, or rendered harmless, or determined to be harmful by District, as certified by an independent testing laboratory and approved by the appropriate government agency.

10.4.3 Indemnification by Contractor for Hazardous Material Caused by Contractor.

In the event the hazardous materials on the Project Site is caused by the Contractor, the Contractor shall pay for all costs of testing and remediation, if any, and shall compensate the District for any additional costs incurred as a result of Contractor’s generation of hazardous material on the Project.
Site. In addition, the Contractor shall defend, indemnify and hold harmless District and its agents, officers, and employees from and against any and all claims, damages, losses, costs and expenses incurred in connection with, arising out of, or relating to, the presence of hazardous material on the Project Site.

10.4.4 Terms of Hazardous Material Provision.

The terms of this Hazardous Material provision shall survive the completion of the Work and/or any termination of this Contract.

ARTICLE 11

INSURANCE AND BONDS

11.1 Not used

11.2 Not used

11.3 Not used

11.4 Not used

11.5 OTHER INSURANCE

The Contractor shall provide all other insurance required to be maintained under applicable laws, ordinances, rules, and regulations.

11.6 PROOF OF INSURANCE

The Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract until all required insurance and certificates have been obtained and delivered in duplicate to the District for approval subject to the following requirements:

(a) Certificates and insurance policies shall include the following clause:

"This policy shall not be non-renewed, canceled, or reduced in required limits of liability or amounts of insurance until notice has been mailed to the District. Date of cancellation or reduction may not be less than thirty (30) days after the date of mailing notice."

(b) Certificates of insurance shall state in particular those insured, the extent of insurance, location and operation to which the insurance applies, the expiration date, and cancellation and reduction notices.

(c) Certificates of insurance shall clearly state that the District and the Architect are named as additional insureds under the policy described and that such insurance policy shall be primary to any insurance or self-insurance maintained by District.
(d) The Contractor and its Subcontractors shall produce a certified copy of any insurance policy required under this Section upon written request of the District.

11.7 COMPLIANCE

In the event of the failure of any contractor to furnish and maintain any insurance required by this Article 11, or in Section 00600, Construction Agreement, the Contractor shall be in default under the Contract. Compliance by Contractor with the requirement to carry insurance and furnish certificates or policies evidencing the same shall not relieve the Contractor from liability assumed under any provision of the Contract Documents, including, without limitation, the obligation to defend and indemnify the District and the Architect.

11.8 WAIVER OF SUBROGATION

Contractor waives (to the extent permitted by law) any right to recover against the District for damages to the Work, any part thereof, or any and all claims arising by reason of any of the foregoing, but only to the extent that such damages and/or claims are covered by property insurance and only to the extent of such coverage (which shall exclude deductible amounts) by insurance actually carried by the District.

The provisions of this section are intended to restrict each party to recovery against insurance carriers only to the extent of such coverage and waive fully and for the benefit of each, any rights and/or claims which might give rise to a right of subrogation in any insurance carrier. The District and the Contractor shall each obtain in all policies of insurance carried by either of them, a waiver by the insurance companies thereunder of all rights of recovery by way of subrogation for any damages or claims covered by the insurance.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 Uncovering Work for Required Inspections.

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the Inspector or the Architect, be uncovered for the Inspector's or the Architect's observation and be replaced at the Contractor's expense without change in the Contract Sum or Time.

12.1.2 Costs for Inspections not Required.

If a portion of the Work has been covered which the Inspector or the Architect has not specifically requested to observe prior to its being covered, the Inspector or the Architect may request to see such Work, and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncover and replacement shall, by appropriate Change Order, be charged to the District. If such Work is not in accordance with Contract Documents, the Contractor shall pay such costs unless the condition was caused by the District or a separate contractor, in which event the District shall be responsible for payment of such costs to the Contractor.
12.2 CORRECTION OF WORK

12.2.1 Correction of Rejected Work.

The Contractor shall promptly correct the Work rejected by the Inspector or the District upon recommendation of the Architect as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector’s or the Architect’s services and expenses made necessary thereby.

12.2.2 One-Year Warranty or Guaranty Corrections.

If, within one (1) years after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties and guaranties established under this Contract, or by the terms of an applicable special warranty or guaranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so unless the District has previously given the Contractor a written acceptance of such condition. This period of one (1) years shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation under this Paragraph 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

12.2.3 District’s Rights if Contractor Fails to Correct.

If the Contractor fails to correct nonconforming Work within a reasonable time, the District may correct it, pursuant to Article 9.

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW AND REGULATIONS

The Contract shall be governed by the law of the place where the Project is located.

13.1.1 Specific reference in the Specifications to codes and regulations or requirements of regulatory agencies shall mean the latest printed edition of each adopted by the regulatory agency in effect at the time of the opening of Proposals, except as may be otherwise specifically stated in the Contract Documents.

13.1.2 No change order shall be considered for any change in any applicable federal, state or local code or regulation if similar language existed in an alternate applicable regulation in force at the time of opening of Bids.
13.1.3 Contractor shall not allow design or construction of any conditions wherein the finished Work will not comply with current applicable codes. No change order shall be considered by District for the Work correction of any Work not complying with code.

13.1.4 This section shall cover the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

13.1.5 Code, laws, ordinances, rules and regulations referred to shall have full force and effect as though printed in full in these Specifications. Code, laws, ordinances, rules and regulations are not furnished to Contractor because Contractor is assumed to be and shall be familiar with these requirements, including readily available access to these requirements. The listing of applicable codes, laws, and regulations for hazardous waste abatement Work in the Contract Documents is supplied to Contractor as a courtesy and shall not limit Contractor's responsibility for complying with all applicable laws, regulations or ordinances having application to the Work. Where conflict among the requirements or with these Specifications occurs, the most stringent requirements shall be used with no change in Contract Sum or Contract Time.

13.1.6 Contractor shall conform to all applicable federal, state, and local codes, laws, ordinances, rules and regulations, whether or not referenced in the Contract Documents.

13.1.7 Precedence:

13.1.7.1 Where specified requirements differ from the requirements of applicable codes, ordinances and standards, the more stringent requirements shall take precedence.

13.1.7.2 Where Contract Documents require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, Contract Documents shall take precedence so long as such increase is legal.

13.1.7.3 Where no requirements are identified on Contract Documents, comply with all requirements of applicable codes, ordinances and standards of governing authorities have jurisdiction.

13.1.7.4 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 District for a decision before proceeding.

13.2 SUCCESSORS AND ASSIGNS

The District and the Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in
the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3 **WRITTEN NOTICE**

In the absence of specific notice requirements in the Contract Documents, written notice shall be deemed to have been duly served if delivered in person to the individual, member of the firm or entity, or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

13.4 **RIGHTS AND REMEDIES**

13.4.1 Duties and Obligations Cumulative.

Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

13.4.2 No Waiver.

No action or failure to act by the Inspector, the District, or the Architect shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.5 **TESTS AND INSPECTIONS**

13.5.1 Compliance.

Tests, inspections, and approvals of portions of the Work required by the Contract Documents will comply with Title 24, and with all other laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction.

13.5.2 Independent Testing Laboratory.

The District will select and pay an independent testing laboratory to conduct all tests and inspections required by regulatory agencies. Selection of the materials required to be tested shall be made by the laboratory or the District's representative and not by the Contractor. All costs for all other tests shall be included in the Bid Price and shall be paid for by the Contractor. Any costs or expenses of inspection or testing required by regulatory agencies, incurred outside of a fifty (50) mile radius from the Project Site or not located in a contiguous county to the Site, whichever distance is greater, shall be paid for by the District, invoiced by the District to the Contractor, and deducted from the next Progress Payment.

13.5.3 Contractor Responsibilities

13.5.3.1 Package and deliver to laboratory at designated location adequate samples of materials proposed to be used which require testing. Samples shall
be selected by laboratory personnel. Allow proper time for selecting samples, and making tests or considerations.

13.5.3.2 Cooperate with laboratory personnel, and provide access to work and to manufacturer's facilities.

13.5.3.3 Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples as selected by laboratory personnel at the site or at source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.

13.5.3.4 Schedule all tests and inspections with the testing and inspections firm and to notify Construction Manager and Project Inspector a minimum of 3 working days prior to expected time for operations requiring inspection and testing services. Do not allow work to be covered prior to inspection and testing.

13.5.3.5 Cooperate fully with the testing laboratory's personnel and with special inspectors in inspection any part of the construction and in taking any samples of materials required to be tested. Provide access to the work. The Contractor's personnel shall furnish and cut or prepare all samples in the presence of either the testing laboratory personnel or the special inspectors and secure the witness's initial on each sample prepared.

13.5.3.6 Notify the testing laboratory to send a bonded messenger to pick up the initialed samples the same day the samples were prepared. Alert the testing laboratory 3 working days in advance as to the times and location of the required sampling, tests and inspections so as to not delay the work of the project, and make sure that the required sampling, tests inspections are promptly completed.

13.5.4 Contractor Paid Test/Inspection Reports:

13.5.4.1 Reports will comply with Section 4-335(d), Part 1, Title 24, CCR.

13.5.4.2 Include every test and inspection made regardless of whether such tests and inspections indicate that the material and procedures are satisfactory or unsatisfactory.

13.5.4.3 Include records of special sampling operations as required.

13.5.4.4 Indicate that materials were sampled and tested in accordance with requirements of CCR regulations and Construction Documents.

13.5.4.5 Indicate specified design strength of materials such as masonry, concrete and steel.

13.5.4.6 State whether or not materials and procedures comply with requirements of the Construction Documents.

13.5.4.7 Submit copies of reports to Construction Manager, District, Architect, Project Inspector, Structural Engineer, Civil Engineer, Soils Engineer and Contractor within 14 days of tests. Submit copies of reports of non-complying materials and procedures immediately.
13.5.5 Advance Notice to Inspector.

The Contractor shall notify the Inspector a sufficient time in advance of its readiness for required observation or inspection so that the Inspector may arrange for same, but no less than 2 work days. The Contractor shall notify the Inspector a sufficient time in advance, but no less than 2 work days, of the manufacture of material to be supplied under the Contract Documents which must, by terms of the Contract Documents, be tested in order that the Inspector may arrange for the testing of the material at the source of supply.

13.5.6 Testing Off-Site.

Any material shipped by the Contractor from the source of supply, prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said Inspector that such testing and inspection will not be required, shall not be incorporated in the Work.

13.5.7 Additional Testing or Inspection.

If the Inspector, the Architect, the District, or public authority having jurisdiction determines that portions of the Work require additional testing, inspection, or approval not included under Paragraph 13.5.1, the Inspector will, upon written authorization from the District, make arrangements for such additional testing, inspection, or approval. The District shall bear such costs except as provided in Paragraph 13.5.7.

13.5.8 Costs for Retesting.

If such procedures for testing, inspection, or approval under Paragraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs arising from such failure, including those of re-testing, re-inspection, or re-approval, including, but not limited to, compensation for the Architect’s services and expenses. Any such costs shall be paid by the District, invoiced to the Contractor, and deducted from the next Progress Payment.

13.5.9 Retesting Covered Work.

Re-examination of previously tested and inspected work may be ordered by the District, Architect, or by the Project Inspector. The Contractor shall uncover such work if retesting is ordered. If work is found in accordance with Contract Documents, the District will pay costs of uncovering, removing, retesting and replacing. If work is found not in accordance with Contract Documents, the District will deduct the cost of retesting from the Contract Sum by Change Order and the Contractor will bear the costs of uncovering, removing and replacing work.

13.5.10 Costs for Premature Test.

In the event the Contractor requests any test or inspection for the Project and is not completely ready for the inspection, the Contractor shall be invoiced by the District for all costs and expenses resulting from that testing or inspection, including, but not limited to, the Inspector’s and Architect’s fees and expenses, and the amount of the invoice of shall be deducted from the next Progress Payment.
13.6 **TRENCH EXCAVATION**

13.6.1 Trenches Greater Than Five Feet.

Pursuant to Labor Code § 6705, if the Contract Price exceeds $25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, submit to the District or a registered civil or structural engineer employed by the District or Architect, a detailed plan showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches. Said detailed plan shall be prepared by a California licensed civil or structural engineer employed by the Contractor.

13.6.2 Excavation Safety.

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, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted in writing by the District or by the person to whom authority to accept has been delegated by the District.

13.6.3 No Tort Liability of District.

Pursuant to Labor Code § 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

13.6.4 No Excavation Without Permits.

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CAL OSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

13.7 **WAGE RATES, TRAVEL, AND SUBSISTENCE**

13.7.1 Wage Rates.

Pursuant to the provisions of Article 2 (commencing at § 1720), Chapter 1, Part 7, Division 2, of the Labor Code, the District has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public works project is to be performed for each craft, classification, or type of worker needed for this Project from the Director of the Department of Industrial Relations ("Director"). These rates are on file at the administrative office of the DISTRICT and are also available from the Director of the Department of Industrial Relations. Copies will be made available to any interested party on request. The Contractor shall post a copy of such wage rates at appropriate, conspicuous, weatherproof points at the Site.

Any worker employed to perform work on the Project, but such work is not covered by any classification listed in the published general prevailing wage rate determinations or per diem wages determined by the Director of the Department of Industrial Relations, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to the employment of such person in such classification.
13.7.2 Holiday and Overtime Pay.

Holiday and overtime work, when permitted by law, shall be paid for at the rate set forth in the prevailing wage rate determinations issued by the Director of the Department of Industrial Relations or at least one and one-half (1½) times the specified basic rate of per diem wages, plus employer payments, unless otherwise specified in the contract documents or authorized by law.

13.7.3 Wage Rates Not Affected by Subcontracts.

The Contractor shall pay and shall cause to be paid each worker engaged in the execution of the Work on the Project not less than the general prevailing rate of per diem wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such workers.

13.7.4 Per Diem Wages.

The Contractor shall pay and shall cause to be paid to each worker needed to execute the Work on the Project per diem wages including, but not limited to, employer payments for health and welfare, pensions, vacation, travel time and subsistence pay as provided for in Labor Code §1773.1.

13.7.5 Forfeiture and Payments.

Pursuant to Labor Code §1775 and the District’s Labor Compliance Program, the Contractor shall forfeit to the District, not more than Fifty Dollars ($50.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing wages rates as determined by the Director of the Department of Industrial Relations, for the work or craft in which the worker is employed for any Work done under the Agreement by the Contractor or by any Subcontractor under it. The amount of the penalty shall be determined by the Labor Commissioner and shall be based on consideration of: (1) whether the Contractor or Subcontractor’s failure to pay the correct rate of per diem wages was a good faith mistake and, if so, the error was promptly and voluntarily correct upon being brought to the attention of the Contractor or Subcontractor; and (2) whether the Contractor or Subcontractor has a prior record of failing to meet its prevailing wage obligations. Further details regarding the enforcement of paying prevailing wage rates, reporting violations, withholding contract payments, forfeitures and hearing to review withholding of contract payments are set forth in the District’s Labor Compliance Program.

13.8 RECORDS OF WAGES PAID

13.8.1 Payroll Records.

(a) Pursuant to §1776 of the Labor Code, each Contractor and Subcontractor shall keep an accurate payroll record showing the name, address, social security number, work classification and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker or other employee employed in connection with the Project.

(b) All payroll records shall be certified and submitted to the District with each application for payment, but shall not be submitted less than once per month. All payroll records shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:
(1) A certified copy of an employee’s payroll record shall be made available for inspection or furnished to the employee or their authorized representative on request.

(2) A certified copy of all payroll records shall be made available for inspection or furnished upon request to a representative of District, the Division of Labor Standards Enforcement or the Division of Apprenticeship Standards of the Department of Industrial Relations.

(3) A certified copy of all payroll records shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through the District, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to Paragraph (2) above, the requesting party shall, prior to being provided the records, reimburse the costs, according to law for the preparation by the Contractor, Subcontractor(s), and the entity through which the request was made. The public shall not be given access to such records at the principal office of the Contractor.

(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the Division of Labor Standards Enforcement.

(d) The Contractor or Subcontractor(s) shall file a certified copy of all payroll records with the entity that requested such records within 10 calendar days after receipt of a written request.

(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the District, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual’s name, address and social security number. The name and address of the Contractor awarded the Contract or the Subcontractor(s) performing the Contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual’s name and social security number.

(f) The Contractor shall inform the District of the location of all payroll records, including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

(g) The Contractor or Subcontractor(s) shall have 10 calendar days in which to comply subsequent to receipt of a written notice requesting payroll records. In the event that the Contractor or Subcontractor(s) fails to comply within the 10-day period, the Contractor or Subcontractor(s) shall, as a penalty to the District, forfeit Twenty-Five Dollars ($25.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of...
Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

Responsibility for compliance with this Article and the District’s Labor Compliance Program shall rest upon the Contractor.

13.8.2 Withholding of Contract Payments & Penalties.

The District may withhold or delay contract payments to the Contractor and/or any Subcontractor if:

(a) The required prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations is not paid to all workers employed on the Project; or

(b) The Contractor or Subcontractor(s) fail to submit all required certified payroll records with each application for payment, but not less than once per month; or

(c) The Contractor or Subcontractor(s) submit incomplete or inadequate payroll records; or

(d) The Contractor or Subcontractor(s) fail to comply with the Labor Code requirements concerning apprentices; or

(e) The Contractor or Subcontractor(s) fail to comply with the District’s Labor Compliance Program; or

(f) The Contractor or Subcontractor(s) fail to comply with any applicable state laws governing labor on public works projects.

Any withholding of contract payments and penalties are set forth in the District’s Labor Compliance Program.

13.9 APPRENTICES

13.9.1 Apprentice Wages and Definitions.

All apprentices employed by the Contractor to perform services under the Contract shall be paid the standard wage paid to apprentices under the regulations of the craft or trade for which he or she is employed, and as determined by the Director of the Department of Industrial Relations, and shall be employed only at the Work of the craft or trade to which he or she is registered. Only apprentices, as defined in §3077 of the Labor Code, who are in training under apprenticeship standards that have been approved by the Chief of the Division of Apprenticeship Standards and who are parties to written apprenticeship agreements under Chapter 4 (commencing with §3070) of Division 3, are eligible to be employed under this Contract. The employment and training of each apprentice shall be in accordance with the apprenticeship standards and apprentice agreements under which he or she is training, or in accordance with the rules and regulations of the California Apprenticeship Council.
13.9.2 Employment of Apprentices.

Contractor agrees to comply with the requirements of Labor Code §1777.5. The Contractor awarded the Project, or any Subcontractor under him or her, when performing any of the Work under the Contract or subcontract, employs workers in any apprenticeable craft or trade, the Contractor and Subcontractor shall employ apprentices in the ratio set forth in Labor Code §1777.5. The Contractor or any Subcontractor must apply to any apprenticeship program in the craft or trade that can provide apprentices to the Project site for a certificate approving the Contractor or Subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, the decision of the apprenticeship program to approve or deny a certificate shall be subject to review by the Administrator of Apprenticeship. The apprenticeship program or programs, upon approving the Contractor or Subcontractor, shall arrange for the dispatch of apprentices to the Contractor or Subcontractor. The Contractor or Subcontractor covered by an apprenticeship program’s standards shall not be required to submit any additional application in order to include additional public works contracts under that program. “Apprenticeable craft or trade” as used in this Article means a craft or trade determined as an apprenticeable occupation in accordance with the rules and regulations prescribed by the California Apprenticeship Council. The ratio of work performed by apprentices to journeyman employed in a particular craft or trade on the Project shall be in accordance with Labor Code §1777.5.

13.9.3 Submission of Contract Information.

Prior to commencing work on the Project, the Contractor and Subcontractors shall submit contract award information to the applicable apprenticeship program(s) that can supply apprentices to the Project and make the request for the dispatch of apprentices in accordance with the Labor Code. The information submitted shall include an estimate of journeyman hours to be performed under the Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to the District. Within 60 days after concluding work on the Project, the Contractor and Subcontractors shall submit to the District, if requested, and to the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the Project.

13.9.4 Apprentice Fund.

The Contractor or any Subcontractor under him or her, who, in performing any of the Work under the Contract, employs journeymen or apprentices in any apprenticeable craft or trade shall contribute to the California Apprenticeship Council the same amount that the Director determines is the prevailing amount of apprenticeship training contributions in the area of the Project. The Contractor and Subcontractors may take as a credit for payments to the California Apprenticeship Council any amounts paid by the Contractor or Subcontractor to an approved apprenticeship program that can supply apprentices to the Project. The Contractor and Subcontractors may add the amount of the contributions in computing his or her bid for the Contract.

13.9.5 Prime Contractor Compliance.

The responsibility of compliance with Article 13 and §1777.5 of the Labor Code for all apprenticeable occupations is with the Prime Contractor. Any Contractor or Subcontractor that knowingly violates the provisions of this Article or Labor Code §1777.5 shall be subject to the penalties set forth in Labor Code §1777.7 and the District’s Labor Compliance Program.
13.10 **ASSIGNMENT OF ANTITRUST CLAIMS**

13.10.1 Application.

Pursuant to Government Code § 4551, in entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the District 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) or under the Cartwright Act (Chapter 2 [commencing with § 16700] of Part 2 of Division 7 of the Business and Professions Code), 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 the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties. If the District receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under Chapter 11 (commencing with § 4550) of Division 5 of Title 1 of the Government Code, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the District any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the District as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

13.10.2 Assignment of Claim.

Upon demand in writing by the assignor, the District shall, within one (1) year from such demand, reassign the cause of action assigned pursuant to this Article if the assignor has been or may have been injured by the violation of law for which the cause of action arose and the District has not been injured thereby or the District declines to file a court action for the cause of action.

13.11 **STATE AUDIT**

Pursuant to and in accordance with the provisions of Government Code § 10532, or any amendments thereto, all books, records, and files of the District, the Contractor, or any Subcontractor connected with the performance of this Contract involving the expenditure of state funds in excess of Ten Thousand Dollars ($10,000.00), including, but not limited to, the administration thereof, shall be subject to the examination and audit of the Office of the Auditor General of the State of California for a period of three (3) years after final payment is made under this Contract. Contractor shall preserve and cause to be preserved such books, records, and files for the audit period.

13.12 **Not Used**

(a)

13.13 **INDUSTRY STANDARDS**

13.13.1 Applicability of Standards.

Unless the Contract Documents specify 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.
13.13.2 Publication Dates.

Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

13.13.3 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.

13.13.4 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 contained within the Contract Documents. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

13.13.5 Abbreviations and Acronyms for 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."

13.14 PRODUCTS

13.14.1 All products are to be new and not previously incorporated into or used in any other project or facility. Products salvaged or recycled from other projects are not considered new products and are not permitted.

13.14.2 The term product, as used in the Contract Documents, includes materials, equipment, systems, and like terms of similar intent.

13.14.3 Products include materials, machinery, components, equipment, fixtures and systems forming the Work and purchased for incorporation into the Work.

13.14.4 Do not reuse materials and/or equipment removed from existing premises except as specifically permitted by the Contract Documents.

13.14.5 Provide interchangeable components of the same manufacturer, for similar components.

13.14.6 Named products are items identified in the Contract Documents 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.
13.14.7 TRANSPORTATION AND HANDLING

13.14.7.1 Transport and handle products in accordance with manufacturer's instructions.

13.14.7.2 Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

13.14.8 SHIPPING REQUIREMENTS

13.14.8.1 Preparation for Shipment: All equipment shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.

13.14.8.2 Painted and coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted and coated surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of District at the expense of Contractor.

13.14.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

13.14.9.1 Store products only in staging area per provisions of the Contract Documents.

13.14.9.2 Handle, store, and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate-controlled enclosures.

13.14.9.3 For exterior storage of fabricated products, place on appropriate supports, above ground.

13.14.9.4 Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

13.14.9.5 Deliver, store and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

13.14.9.6 Contractor shall comply with the following without limitation:

(a) Contractor shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the Site and shall comply with the requirements specified herein and provide required information concerning the shipment and delivery of the materials specified in the Contract Documents.

(b) Electrical equipment and all equipment with antifriction or sleeve bearings shall be stored in weather-tight structures maintained at a temperature above 60 degree Fahrenheit. Electrical equipment controls and insulation shall be protected against moisture and water damage. All space heaters furnished in or with equipment shall be connected and operated continuously or according to manufacturer's requirements.

(c) Equipment and materials shall not have any pitting, rust, decay, or other deleterious effects of storage when installed in the Work.
(d) Store products to allow for inspection, measurement, and/or counting of units.
(e) Store materials in a manner that will not endanger adjacent Work.
(f) Store products that are subject to damage by the elements, under cover in a weather-
tight enclosure above ground, with ventilation adequate to prevent condensation.
(g) Store cementitious products and materials on elevated platforms.
(h) Comply with product manufacturer's written instructions for temperature, humidity,
ventilation, and weather-protection requirements for storage.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR FOR CAUSE

14.1.1 Grounds for Termination.

The Contractor may terminate the Contract if the Work is stopped for a period of thirty (30)
consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their
agents or employees, or any other persons performing portions of the Work for whom the Contractor is
contractually responsible, for only the following reasons:

(a) Issuance of an order of a court or other public authority having jurisdiction; or
(b) An act of government, such as a declaration of national emergency.

14.1.2 Notice of Termination.

If one of the above reasons exists, the Contractor may, upon written notice of seven (7)
additional days to the District, terminate the Contract and recover from the District payment for Work
executed and for reasonable costs verified by the Architect with respect to materials, equipment, tools,
construction equipment, and machinery, including reasonable overhead, profit, and damages.

14.2 TERMINATION BY THE DISTRICT FOR CAUSE

14.2.1 Grounds for Termination.

The District may terminate the Contractor and/or this Contract for the following reasons:

(a) Persistently or repeatedly refuses or fails to supply enough properly skilled workers or
proper materials;
(b) Persistently or repeatedly is absent, without excuse, from the job site;
(c) Fails to make payment to Subcontractors, suppliers, materialmen, etc.;
(d) Persistently disregards laws, ordinances, rules, regulations, or orders of a public
authority having jurisdiction; or
(e) Becomes bankrupt or insolvent, including the filing of a general assignment for the benefit of creditors; or

(e) Otherwise is in substantial breach of a provision of the Contract Documents.

14.2.2 Notification of Termination.

When any of the above reasons exist, the District may, without prejudice to any other rights or remedies of the District and after giving the Contractor and the Contractor’s surety, if any, written notice of seven (7) days, except in the event of an emergency or critical path delay to the schedule in which case the District may give written notice of forty-eight (48) hours, terminate the Contract and may, subject to any prior rights of the surety:

(a) Take possession of the Project and of all material, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

(b) Accept assignment of Subcontracts. Contractor acknowledges and agrees that if the District (in its sole and absolute discretion) decides to takeover completion of the Project, the Contractor agrees to immediately assign all subcontracts to the District which the District has chosen to accept; and

(c) Complete the Work by any reasonable method the District may deem expedient, including contracting with a replacement contractor or contractors.

14.2.3 Payments Withheld.

If the District terminates the Contract for one of the reasons stated in Paragraph 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is complete. All costs associated with the termination and completion of the Project shall be the responsibility of the Contractor and/or its surety.

14.2.4 Payments Upon Completion.

If the unpaid balance of the Contract Sum exceeds costs of completing the Work, including compensation for professional services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the District. The amount to be paid to the Contractor, or District, as the case may be, shall be certified by the Architect upon application. This payment obligation shall survive completion of the Contract.

14.3 TERMINATION OF CONTRACT BY DISTRICT (CONTRACTOR NOT AT FAULT)

14.3.1 Termination for Convenience.

District may terminate the Contract upon fifteen (15) calendar days of written notice to the Contractor and use any reasonable method the District deems expedient to complete the project, including contracting with replacement contractor or contractors, if it is found that reasons beyond the control of either the District or Contractor make it impossible or against the District’s interest to complete the work. In such a case, the Contractor shall have no claims against the District except: (1) the actual cost for labor, materials, and services performed which may be documented through timesheets, invoices, receipts, or otherwise, and (2) ten percent (10%) profit and overhead, and (3) five percent (5%) termination cost of the total of items (1) and (2). Contractor acknowledges and agrees that
if the District (in its sole and absolute discretion) decides to takeover completion of the Project, the Contractor agrees to immediately assign all subcontracts to the District which the District has chosen to accept.

14.3.2 Non-Appropriation of Funds/ Insufficient Funds.

In the event that sufficient funds are not appropriated to complete the Project or the DISTRICT determines that sufficient funds are not available to complete the Project, DISTRICT may terminate or suspend the completion of the Project at any time by giving written notice to the Contractor. In the event that the DISTRICT exercises this option, the DISTRICT shall pay for any and all work and materials completed or delivered onto the site for which value is received, and the value of any and all work then in progress and orders actually placed which cannot be canceled up to the date of notice of termination. The value of work and materials paid for shall include a factor of fifteen percent (15%) for the Contractor's overhead and profit and there shall be no other costs or expenses paid to Contractor. All work, materials and orders paid for pursuant to this provision shall become the property of the DISTRICT. DISTRICT may, without cause, order Contractor in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as DISTRICT may determine. Adjustment shall be made for increases in the cost of performance of the Agreement caused by suspense, delay or interruption.

14.4 REMEDIES OTHER THAN TERMINATION

If a default occurs, the District may, without prejudice to any other right or remedy, including, without limitation, its right to terminate the Contract pursuant to Article 14.2, do any of the following:

(a) Permit the Contractor to continue under this Contract, but make good such deficiencies or complete the Contract by whatever method the District may deem expedient, and the cost and expense thereof shall be deducted from the Contract Price or paid by the Contractor to the District on demand;

(b) If the workmanship performed by the Contractor is faulty or defective materials are provided, erected or installed, then the District may order the Contractor to remove the faulty workmanship or defective materials and to replace the same with work or materials that conform to the Contract Documents, in which event the Contractor, at its sole costs and expense, shall proceed in accordance with the District's order and complete the same within the time period given by the District in its notice to the Contractor; or

(c) Initiate procedures to declare the Contractor a non-responsible bidder for a period of two to five years thereafter.

All amounts expended by the District in connection with the exercise of its rights hereunder shall accrue interest from the date expended until paid to the District at the maximum legal rate. The District may retain or withhold any such amounts from the Contract Price. If the Contractor is ordered to replace any faulty workmanship or defective materials pursuant to Paragraph (b) above, the Contractor shall replace the same with new work or materials approved by the Architect and the District, and, at its own cost, shall repair or replace, in a manner and to the extent the Architect and the District shall direct, all work or material that is damaged, injured or destroyed by the removal of said faulty workmanship or defective material, or by the replacement of the same with acceptable work or materials. In no event shall anything in this Paragraph be deemed to constitute a waiver by the District

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of any other rights or remedies that it may have at law or in equity, it being acknowledged and agreed by the Contractor that the remedies set forth in this Paragraph are in addition to, and not in lieu of, any other rights or remedies that the District may have at law or in equity.

END OF SECTION 00700
SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 WORK DESCRIPTIONS WITHOUT FORCE
   A. All general descriptions and/or general summaries of the work noted in this section, or elsewhere within the Contract Documents, are without force and effect on the Contract Work described and indicated in detail the Contract Documents. These general descriptions and summaries are for general reference and descriptive purposes only and in no way offer the complete and concise description of all the Work required by the Contract Documents.

1.3 WORK COVERED BY CONTRACT DOCUMENTS
   A. The intent of the Contract Documents includes but is not limited to: general construction to seismically retrofit multiple buildings located on Campus. Other Work includes, but is not limited to, abatement, temporary construction, demolition, structural, electrical, mechanical, signage and architectural finishes.

1.4 CONTRACTS
   A. Perform the work under a single, fixed-price Contract.

1.5 WORK SEQUENCE
   A. During construction operations, various adjoining areas will be occupied and their functions maintained. Temporary construction separations such as walls for sound and dust control, as well as pathway barricades, signage and clearly marked temporary pedestrian path of travel detours will be required and provided by the Contractor.
   B. Scheduling of Contractor's use of the areas and times involved shall be determined in cooperation with the District. Notify the District a minimum of 10-days prior to commencement of work.
   C. Construction activities shall be performed between the hours of 7AM and 5PM, Monday through Friday, unless otherwise required. No Work shall be performed outside the above hours without prior written authorization from the Construction Manager.

1.6 ADDITIONAL WORK SCHEDULE REQUIREMENTS: See Section 01140, Work Restrictions.

1.7 CAMPUS HOLIDAYS
   A. The College is closed with no classes held on the following holidays: Labor Day; Native American Day; Veteran’s Day; Thanksgiving; Winter Recess; Martin Luther King Day; President’s Day; Spring Recess. The Contractor may work on these days with prior approval by the District.
1.8 USE OF PREMISES

A. Contractor shall only use the premises for work, storage, staging areas, and vehicular parking as designated in the Contract Documents.

1.9 EXISTING AREA CONDITION SURVEY

A. Prior to commencement of work, jointly survey the existing area to be remodeled with the District and Architect, noting and recording existing damage such as cracks, sags, and other damage (on Site Plan/Floor Plans).

B. This record shall serve as a basis for determination of subsequent damage to these items due to settlement, movement, demolition, or Contractor’s operations.

C. Existing damage observed shall be marked and the official record of existing damage shall be signed by the parties making the survey.

D. Cracks, sags, and damage to the area and other items not noted in the original survey but subsequently observed shall be reported immediately to the Architect.

E. Contractor shall take photographs or video recordings and submit these to the District for review of adequacy and approval in order to comply with this requirement.

1.10 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings may not show all existing water, gas, electrical, and hot water lines, and other items known or suspected to exist in the area of the work.

B. Contractor shall locate these installations before proceeding with demolition or other operations which may cause damage, maintain them in service where appropriate, and repair damage caused by the performance of the Work, at no increase in the Contract Sum.

C. In addition to notification, if a structure or utility is damaged, take appropriate action as specified in the General Conditions.

1.12 USE AND OCCUPANCY OF WORK PRIOR TO ACCEPTANCE BY DISTRICT

A. The District may use and occupy the building before formal acceptance under the following conditions:

1. A Certificate of Substantial Completion shall be prepared and executed as provided in the Contract Documents. The Certificate of Substantial Completion shall be accompanied by a written endorsement of the Contractor's insurance carrier and surety permitting occupancy by the District during the remaining period of the work.

2. Occupancy by the District shall not be construed as being an acceptance of that part of the Work occupied.

3. The Contractor will not be held responsible for damage to the occupied part of the Work resulting from the District’s occupancy.

4. Occupancy by the District shall not be deemed to constitute a waiver of existing claims the District or Contractor may have against each other.


6. The District will pay for utility costs associated with occupancy during construction.
1.13 PROTECTION OF EXISTING IMPROVEMENTS
A. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place.
B. Protect improvements on adjoining properties as well as those on the District’s property.
C. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line.
D. Restore any improvements damaged by this work to their original condition as acceptable to the District or other parties or authorities having jurisdiction.

1.14 HAZARDOUS MATERIALS
A. Comply with all requirements included in other sections of Contract Documents.

1.15 MISCELLANEOUS PROVISIONS
A. Items shown, described or scheduled to be salvaged will remain the property of the District. Store as directed by the Construction Manager.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF SECTION 01010
SECTION 01050
FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUBMITTALS
   A. Contractor shall submit name and address of Surveyor and Professional Engineer to District for approval prior to their work on the Project.
   B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
   C. At completion of the Work, Contractor shall submit a certificate signed by a licensed engineer or surveyor certifying that all elevations and locations of improvements are in conformance with Contract Documents.

1.3 REQUIREMENTS

1.4 QUALIFICATIONS OF SURVEYOR OR ENGINEERS
   A. Contractor shall only use a qualified licensed engineer or registered land surveyor, approved by the District, of the discipline required for specific service on Project, licensed in the State of California.
   B. Submit evidence of Engineer’s errors and omissions insurance coverage to District, in the form of a current Insurance Certificate.

1.5 SURVEY REFERENCE POINTS
   A. Existing basic horizontal and vertical control points for the project are those designated on the Drawings.
   B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
      1. Make no changes or relocation without prior written notice to District and Architect.
      2. Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
3. Require surveyor to replace project control points based on original survey control that may be lost or destroyed.

4. Contractor to locate and protect existing survey control and reference points.

5. Control datum for survey is that indicated on Drawings.

6. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

7. Promptly report to Architect, District, and Project Inspector the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

8. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice.

1.6 PROJECT RECORD DOCUMENTS
   A. Maintain complete, accurate log of control and survey work as it progresses. Indicate dimensions, locations, angles, and elevations of construction and Site Work.
   B. Submit Record Documents as required under provisions of these Contract Documents.

1.7 EXAMINATION
   A. Verify locations of survey control points prior to starting Work. Promptly notify District and Architect of any discrepancies discovered.

1.8 SURVEY REQUIREMENTS
   A. Provide field engineering services. Utilize recognized engineering survey practices.
   B. Establish a minimum of two permanent bench marks on Site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record documents.
   C. Establish lines and levels, locate and lay out by instrumentation and similar appropriate means:
      1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
      2. Grid or axis for structures.
      3. Building foundation, column locations, and ground floor elevations.
   D. Periodically verify layouts by same means.

PART 2 – PRODUCTS - Not Used

PART 3 – EXECUTION

3.1 Contractor is responsible for meeting all applicable codes, OSHA, and other safety and shoring requirements.

3.2 Contractor is responsible for any re-surveying required by correction of nonconforming work with no additional cost to the District or its representatives.

END OF SECTION 01050
SECTION 01140
WORK RESTRICTIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Division 1 Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY OF WORK RESTRICTION REQUIREMENTS

A. Prior to the start of Work, Contractor shall familiarize itself with the Work Restrictions as they relate to all Work required by the Contract Documents.

B. Work Restricted Activity Plan shall include:

1. Full size drawing (36"x42") of site plan showing the proposed locations and dimensions of temporary facilities and Work Restriction Activities including but not limited to all proposed trailers, equipment and material storage areas on the Project site; safe and ADA complaint access (ingress/egress) for pedestrians and vehicles around the construction areas; proposed haul routes; all temporary construction and way-finding signage; temporary fenced area(s), noise barriers, and dust partitions; and temporary measures to maintain continuous and uninterrupted code compliant use of all occupied areas. Identify any areas that require temporary paving for stabilization or prevention of tracking of mud, and for ADA complaint ingress and egress. Indicate if the use of supplemental or other staging areas might be required. Also see Section 01500 for Temporary Facilities and Control for additional requirements.

2. Contractor shall submit four (4) hard copies and email Adobe PDF Format of the initial submittal of the Work Restricted Activity Plan for review by the District, Architect, and by personnel from the Campus (e.g., Buildings & Grounds, Police Department, and other representatives).

C. Contractor shall construct dust partitions prior to the start of demolition and they must remain in place until the completion of that activity where required.

D. Contractor shall perform and complete all Work Restricted Activities to ensure the following:

1. The continuous and uninterrupted use of all occupied areas, including but not limited to the applicable power, data, telephone, waterline, fire alarm system, fire sprinkler system mechanical, gas, storm, sewage, plumbing, and electrical systems serving these areas.

2. Protection of students, staff, faculty and personnel in occupied areas and surrounding and adjacent areas from the hazards and dust associated with construction.

3. The work areas, roads, parking lots, and streets are to be kept clear, clean, and free of loose debris, construction materials and partially installed work which would create a safety hazard or interfere with subcontractor and personnel duties and traffic. The Contractor shall sweep the areas clean at the end of each work day and make every effort to keep dust and noise to a minimum at all times.
4. Prior to starting work, the Contractor shall provide a proposed schedule of temporary interruptions or shutdown of any utility or electrical/mechanical systems to the District Representatives. The Contractor shall provide written request (5) working days prior to the desired time for the proposed interruption(s). Work shall be performed at times other than the Campus's normal hours of operation, or as directed by the District's Construction Manager. Temporary interruptions shall be completed prior to the start of the next business day at the Campus to maintain continuous and uninterrupted use of Campus facilities.

1.3 SUMMARY OF WORK RESTRICTIONS

A. General: Work Restrictions are comprised of Work Restricted Activities included in the Work Restricted Activity Plan described above. All Work Restricted Activities must be completed within the timelines, work shift times, and the scheduled time period as required by the Contract Documents. Comply with the following:

1. The Work Restricted Activity Plan shall be approved by the District prior to any Work starting on the Project site.

2. Contractor shall have all temporary fencing, signage, ADA compliant pathways and other temporary measures described in Paragraph 1.4 above installed, operational and accepted by the District prior to starting abatement, demolition or other Work as applicable.

B. Time Essential Work Restrictions

1. The Work Restricted Activities that are essential to protect the Campus community, and minimize disruption to the Campus’s daily operations include, but are not limited to: temporary construction fencing, temporary construction barriers, construction and way-finding signage, dust control and safe and ADA complaint access (ingress/egress) for pedestrians and vehicles around the construction areas.

2. Coordination and Time Sensitive Work Restrictions. Work Restricted Activities include the construction and installation of interim utilities; permanent utility/installation and other construction activities related to moving of vital infrastructure to keep portions of the Campus facilities operational during remodeling activities. Certain activities related to these Work Restrictions, which do not disrupt or impact occupied areas of the facility, may be completed during the normal business hours.

C. Other Project Requirements to Meet the Contract Time

1. Work at the Project site cannot commence until Monday, July 7, 2014 unless otherwise approved by the District.

2. Contractor shall include in its bid the cost to work on all Saturdays on critical and near critical path Work (with less than 5 work days of project float) at the Project site between July 7th and August 10th.

3. Contractor shall commence work with the Biological Science Building interior Work, with an emphasis of working north to south. It is essential for the Contractor to commence work in Room #339, Anatomy Laboratory as soon as practical after July 7th, and complete all Work in this room by no later than August 2, 2014.

4. Contractor shall include in its bid the cost to work not only a normal work day shift, but also an eight hour swing shift between July 7th and August 10th for interior Work, to meet the Contract Time. At a minimum, the Contractor's second shift shall focus on critical path and near critical path activities.
5. The staging area for the Contractor's trailers, material, equipment and vehicle parking is limited to Parking Lots #13 and #14, unless otherwise approved by the District. Contractor shall repair all damage to these parking lots from the Contractor's use during construction to the District's satisfaction.

6. Exterior Work for the Physical Science building will be limited to the normal workday shift.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All labor, equipment, materials, and all other requirements shall be provided and will be the sole responsibility of the Contractor for execution of entire work including all Requirements of each Work Restricted Activity.

PART 3 - EXECUTION

3.1 MEANS AND METHODS OF CONSTRUCTION

A. Contractor to provide and shall be responsible for any and all means and methods that will be constructed, implemented and/or maintained on the site for all Work Restricted Activities.

END OF SECTION 01140
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SECTION 01311
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This Section specifies the administrative requirements and includes descriptions of required project coordination for the work including, but not limited to, the following:
   1. Coordination
   2. Coordination of Contract Closeout

1.3 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of Work, with provisions for accommodating items to be installed later and for accommodating items to be installed by other District contractors.

B. Resolve differences or disputes concerning coordination, interference, or extent of Work of the various Sections of the Specifications.

C. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion.

D. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

E. Cooperate with District and District suppliers and/or contractors during move-in and occupancy of the completed Work.

F. Contractor shall coordinate construction operations and means and method of construction included in different 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. Coordinate structural, mechanical, and electrical elements prior to installation. All penetrations of structural elements must first receive approval of Architect and District pursuant to the submittal process described in Section 00700, Contract General Conditions. Rerouting of ductwork, piping, or conduit and resulting changes to other work caused by failure to coordinate beforehand is the responsibility of the Contractor and shall not be considered justification for either additional cost or time.
   2. Schedule construction operations in sequence required to obtain the best constructed results where installation of one part of the Work depends on installation of other components, before or after its own installation.
3. Coordinate installation of different components with other contractors or other trades to ensure maximum and appropriate accessibility for required maintenance, service, and repair. Where availability of space is limited, coordinate installation of different components to ensure maximum and appropriate performance and accessibility for required maintenance, service, operations, and repair of all components, and building systems.

4. Make adequate provisions to accommodate items scheduled for later installation.

5. The manner in which the Specifications are divided into Divisions and Sections is not intended to indicate division of work between trades nor indicate trade union or jurisdictional agreements.
   a. Assign and subcontract construction activities, and employ workers in a manner that will not risk jurisdictional disputes that could result in conflicts, delays, claims, or losses.

1.4 ADMINISTRATIVE COORDINATION

A. 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.

1.5 COORDINATION OF THE WORK

A. Coordinate use of project space and sequence of installation of mechanical, electrical, structural, and other Work which is indicated diagrammatically on Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently for maximum and appropriate accessibility for other installations, for maintenance, service, operations, and for repairs.

B. Contractor shall use large scale drawings, if their preparation is required as part of Work of these specifications, together with shop drawings if applicable and layout drawings of other affected sections of these specifications to check, to coordinate, and to integrate the Work of various sections to prevent interferences.

C. Perform and complete checking and coordination before commencing construction in the affected areas.

D. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of plumbing, fixtures, electrical fixtures, and fixtures and outlets with finish elements.

1.6 CONSERVATION

A. Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections of the Specifications for disposition of salvaged materials that are designated as District's property.
1.7 MEANS AND METHODS
A. Contractor is solely responsible for construction means, methods, techniques, sequences, and procedures for performing all Work.

1.8 ADMINISTRATIVE AND SUPERVISORY PERSONNEL
A. Contractor shall provide other administrative and supervisory personnel as required for proper performance of the Work.
   1. Include specific or dedicated personnel required for coordination of operations with other contractors.

1.9 COORDINATION WITH WORK BY DISTRICT
A. Coordinate service connections for District furnished and District installed equipment. Verify that service connections are correct sizes and in required locations.
B. Coordinate support and anchorage for equipment furnished and installed by the District. Provide blocking and backing as shown or directed to facilitate installation of equipment by others.

1.10 PERIODIC VERIFIED REPORTS
A. The Contractor shall complete and submit the Final Verified Report required by DSA when applicable. In addition to other conditions precedent to Final Payment, the Contractor's completion and submission of the Final Verified Report is an express condition precedent to the District's obligation to make the Final Payment. In addition to completion and submission of the Final Verified Report, as a material obligation under the Contract Documents, the Contractor shall comply all DSA requests for reports or other data relating to the Work, the status thereof or conformity of the Work to the Contract Documents.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION - Not Used.

END OF SECTION 01311
PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This Section specifies administrative requirements and provides descriptions of the required project meetings for the Work and all phases of the Project. These meetings include, but not limited to, the following:

1. Preconstruction Conference
2. Schedule Review Meetings
3. Weekly Project Progress Meetings
4. Construction Schedule and Application for Payment Meetings
5. Special Meetings

1.3 PRECONSTRUCTION CONFERENCE

A. District will schedule and conduct the Preconstruction Conference at a time and place to be determined.

B. Contractor and all major subcontractors, as requested by the District, shall attend the Preconstruction Conference.

C. Meeting agenda will include, but is not limited to, discussion of the following items:

1. Construction Schedules
2. Personnel and vehicle permit procedures
3. Use of premises
4. Location of Contractor’s on-Site facilities
5. Security
6. Housekeeping
7. Submittal and RFI procedures
8. Inspection and testing procedures, on-Site and off-Site
9. Utility shutdown procedures
10. Control and reference point survey procedures
11. Injury and Illness Prevention Program
12. Schedule of Values

Contra Costa Community College District
Contra Costa College
C-633 - Seismic Retrofit, Project 1
13. Schedule of Submittals
14. Project Directory
15. Emergency Contact List

1.4 SCHEDULE OF VALUES & CONSTRUCTION SCHEDULE MEETING

A. See Section 00700, Contract General Conditions, for requirements. Meetings will be held as requested by the District, or as required by the District.

1.5 SHOP DRAWINGS & SUBMITTALS SCHEDULE MEETING

A. See Section 00700, Contract General Conditions, for specific requirements. Meetings will be held as requested by the District, or as required by the District.

1.6 WEEKLY PROGRESS MEETINGS

A. Weekly Progress Meetings will be scheduled throughout duration of Work at a time acceptable to the District. Weekly Progress Meetings will be held weekly unless otherwise directed by District.

1. Meetings shall be held at Construction Manager’s on-site office, unless otherwise directed by the District.

2. The District’s Construction Manager will prepare an agenda, if needed.

3. The District or Architect will record meeting notes of the Weekly Progress Meetings. Within 3 working days after the meeting, the District or Architect will distribute minutes to attendees via e-mail, and to those affected by decisions made at the meeting. Attendees can either submit comments or additions to the minutes within 3 working days. The minutes will constitute a final documentation of the results of meeting.

B. Weekly Progress Meetings shall be attended by the Contractor’s project manager, project engineer, and job superintendent, District Construction Manager, Architect and Engineers, the Inspector of Record, and others as appropriate to agenda topics for each meeting.

C. Agenda will contain the following items, as appropriate:

1. Review, revise as necessary, and approve previous meeting minutes
2. Review Work progress since last meeting
3. Status of Construction Schedule, delivery schedules, adjustments
4. Submittal, RFI, and Change Order status
5. Review of the Contractor’s safety program activities and results, including report on any serious injury and/or damage accidents
6. Review of non-conforming Work (if any)
7. Other items relating to or affecting progress of Work
1.7 Special Meetings

A. District may call special meetings by notifying the desired participants. Special meetings may be held without advance notice in emergency situations.

B. At any time during the progress of Work, District shall have authority to require Contractor to attend a meeting with any or all of the subcontractors engaged in the Work, or in other work, and notice of such meeting shall be duly observed and complied with by Contractor.

C. Contractor shall schedule and conduct its own periodic coordination meetings as necessary to discharge coordination responsibilities.

D. Contractor shall give District 5 work days written notice of its coordination meetings. Contractors shall maintain and distribute minutes of coordination meetings to District. Attendees shall have 3 work days to submit comments or additions to minutes. Minutes will constitute final documentation of results of coordination meetings.

1.8 GUARANTEES/WARRANTIES, BONDS, AND SERVICE & MAINTENANCE CONTRACTS REVIEW MEETING

A. Ten Months following date of final acceptance, Contractor to hold a meeting to review guarantees/warranties, bonds, and service maintenance contracts for materials and equipment. Implement repair or replacement of defective items, and extend service and maintenance contracts, as desired by District.

B. Attending shall be:
   1. District Project Representatives
   2. Architect and Architect’s consultants, as appropriate
   3. Campus Buildings & Ground Representatives
   4. Contractor
   5. Subcontractors, as appropriate
   6. Others, as appropriate

PART 2 - PART 2 – PRODUCTS - Not Used

PART 3 - PART 3 – EXECUTION - Not Used

END OF SECTION 01312
SECTION 01340
ADMINISTRATIVE FORMS & LOGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This section specifies the information and format requirements for administrative forms and logs.

1.3 ADMINISTRATIVE FORMS & LOGS

A. The Contractor shall use District provided administrative forms for the Work. Administrative forms and logs include, but are not limited to, the following:

1. Transmittal Form
2. Submittal Transmittal Form
3. Request for Information Form
4. Substitution Request Form
5. 3-Week Projected Construction Schedule Form
6. 3-Week Testing & Inspection Schedule Form
7. Proposed Change Order Form*
8. Change Order Form*
9. Request for Information Log Form
10. Submittal Log Form
11. Proposed Change Order Log Form
12. Change Order Log Form
13. Contractor's Proposal for Contract Modification Form* (includes sample numbers to demonstrate calculations only)
14. Contractor Production Report
15. Construction Directive Form

B. Forms generated by project management software may be substituted if substitution forms contain essentially the same information as shown in these contract documents. Allowance for the use of substitute forms is at the sole discretion of the District, and shall be requested and approved before use of the substitute form. Forms marked with an asterisk (*) may NOT be substituted under any condition.

C. Microsoft Excel files of these forms are available for Contractor use from the District.
1.4 FORMS INCORPORATED BY REFERENCE

A. Forms available from the California Department of General Services, Division of the State Architect, http://www.dgs.ca.gov/dsa/Forms.aspx, related to administration, construction, testing, and inspection of public work school facilities are hereby incorporated by reference into these Contract Documents.

1.5 CONTRACTOR RESPONSIBILITIES

A. Nothing in this Section, including but not limited to, the above forms and log forms shall be construed to limit, relieve, or release Contractor from liability to District for any damages sustained as a result of inaccurate or incorrect information supplied by the Contractor.

PART 2 – PRODUCTS - Not Used.

PART 3 – EXECUTION - Not Used.

END OF SECTION 01340
SECTION 01400
QUALITY CONTROL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Division 1 Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This Section includes Administrative and Procedural Requirements for Quality Control and Quality Assurance Services includes, but not limited to, the followings:
   1. Quality assurance and control of installation.
   2. References.
   3. Inspection and testing laboratory services
   4. Manufacturers' field services and reports
   5. Field sample
   6. DSA Project Inspector if applicable
   7. Inspection by the Division of the State Architect if applicable
   8. Conflicts

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' written instructions, including each step in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from District's Representative before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. All Work shall be performed by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

G. Contractor's Line of Authority: Contractor shall provide one person who shall be both knowledgeable and responsible for all work to be performed on the Project at all times during normal work hours. In Contractor's absence, Contractor's appointed representative shall be responsible for all directions given him and said directions shall be binding as if given to the Contractor. Contractor's representative shall be responsible to coordinate all Work to be performed on the Project.
H. Shop and field work shall be performed only by mechanics skilled and experienced in the fabrication and installation of the work involved. All work on this Project shall be done in accordance with the best practices of the various trades involved and in accordance with the Contract Documents, approved shop drawings and these specifications.

I. All work shall be erected and installed plumb, level, square and true and in proper alignment and relationship to the work of other trades. All finished work shall be free from defects. The District's Representatives reserve the right to reject any materials and workmanship that are not considered to be of the highest standards of the trades involved. Any such inferior material or workmanship shall be removed and replaced at no additional cost or time impact to the District.

J. The specifications and recommendations of the manufacturer whose materials are used shall be strictly adhered to during the application or installation of materials. Manufacturer's specifications, installation instructions, and testing and startup directions shall be available for inspection on site.

K. Any additional work beyond that specified or illustrated in the Contract Documents, or any modification thereto, that is necessary to obtain the guarantees specified in the Contract Documents shall be provided by the Contractor without any additional cost or time impact to the District.

1.4 REFERENCES

A. Conform to reference standards in force on the most recent date of issue of the approved Contract Documents.

B. When specified reference standards conflict with Contract Documents, request clarification from District's Representative before proceeding.

C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

D. The Contractor shall be responsible for being current and knowledgeable for all building codes involved for all trades under his direction.

E. Provide all work and materials in full in accordance with the latest applicable Rules and Regulations of the California Code of Regulations Title 24 Building Code Standards, the State Fire Marshal, Safety Orders of the Division of Industrial Safety, and any other applicable laws or regulations. Nothing in these plans or specifications is to be construed to permit Work not conforming to these Codes.

F. American Society for Testing and Materials (ASTM):

   1. 29 CFR 1910, Subpart A, Section 1910.7: Definitions and Requirements for a National Recognized Testing Laboratory.

H. NIST: National Institute of Standards and Technology.

I. Furnish all material and labor required to comply with these Rules and Regulations without any additional cost to District.
1.5 MANUFACTURERS' FIELD SERVICES AND REPORTS
   A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting, and balancing of equipment as applicable, and to provide instructions when necessary.
   B. Provide four (4) sets of Manufacturer's Field Representative report to District and Architect for review within 5 days of field observation.
   C. Manufacturer's Field Service: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.

1.6 FIELD SAMPLES
   A. Install field samples at the site for District and Architect review as required by individual Specifications Sections.
   B. Samples accepted by the Architect in writing represent the quality level required for the Work.
   C. Where a field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Architect.

1.7 PROJECT INSPECTOR
   A. District will employ a Project Inspector in accordance with the regulations of the DSA and subject to the provision of Part 1, Title 24, CCR. Project Inspector's authority, rights and duties shall be as set forth in Section 4-342, Part 1, Title 24, CCR.

1.8 INSPECTION BY THE DIVISION OF THE STATE ARCHITECT
   A. Work will be monitored and observed through periodic site visits by the Division of the State Architect Field Inspector according to Section 4-334, Part 1, Title 24, CCR.

1.9 CONFLICTS
   A. Contractor shall comply with rules of documents interpretation as indicated in Contract General Conditions including, but not limited to the following items:
      1. Contract Documents take precedence over statutory requirements or standard when requiring materials of higher quality or performance, or larger sizes or capacity, or greater protection, safety or quantity than required by said codes or standards.
      2. This shall not operate to allow deviations from code requirements, prior approvals and other provisions as specified.
      3. Modifications to published statutory requirements currently adopted or enforced by regulating agencies having jurisdiction shall take precedence over said published requirements.
   B. Conflicts within Contract Documents and/or between Project Manual (including specifications) Drawings, Addenda: The more stringent requirement shall govern.
   C. Subcontractor, supplier, and installer work may be called for in any section of the Contract Documents; Project Manual Specifications, Drawings and Addenda. Work by any one
discipline is not limited to any specification section of the Project Manual, Drawings, Addenda, and Contract Documents shall be bid in total and not in parts.

D. 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. Contractor shall, within (15) working days, notify the Architect in writing for the context of requirements.

E. 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. Contractor shall, within (15) working days, notify any uncertainties to the Architect and District for a decision before proceeding.

1.10 QUALITY CONTROL, GENERAL

A. District will provide inspections, tests, and similar quality control services required performed by the Division of the State Architect. All other tests are Contractor's responsibility.

1. District will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and description of types of testing and inspecting they are engaged to perform.

2. Costs for retesting and re-inspecting 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. See Section 00700, Contact General Conditions, Article 13.5 for additional requirements.

1.11 QUALITY CONTROL: LABORATORY, TESTS, AND REPORTING REQUIREMENTS

A. Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation.

1. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications.

B. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

C. Laboratory Accreditation Authorities: Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at: http://ts.nist.gov/ts/htdocs/210/214/214.htm the American Association of State Highway and Transportation Officials (AASHTO) program at http://www.transportation.org/aashto/home.nsf/frontpage , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/.
D. Capability Check: The District retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

E. Test Results: Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item test or analyzed conforms or fails to conform to specified requirements.
   1. If the item fails to conform, notify the District immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable.
   2. Test results must be signed by a testing laboratory representative authorized to sign certified test reports.
   3. Furnish the signed reports, certifications, and other documentation to the District via the QC Manager.
   4. Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the District. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.12 NOTIFICATION ON NON-COMPLIANCE

A. The District will notify the Contractor of any detected non-compliance with the Contract. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the District may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time for excess costs or damages by the Contractor.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work constitutes acceptance of existing conditions by the Contractor.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special Inspector conducting test or inspection.

B. Maintain test and inspection log at project site. Post changes and modifications as they occur. Provide access at the Project site to the District and Architect, during normal working hours, to Contractor generated test and inspection logs.

3.3 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.4 PREPARATION AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
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 01415
MITIGATION MONITORING REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This Mitigation Monitoring and Reporting Program (MMRP) was formulated based on the findings of the Initial Study/Mitigated Negative Declaration (IS/MND) prepared for the Contra Costa College Improvement Implementation Project. This MMRP is in compliance with Section 1509 of the CEQA Guidelines, which requires that the Lead Agency "adopt a program for monitoring or reporting of the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects." The MMRP lists mitigation measures recommended in the IS/MND and identifies mitigation monitoring requirements.

B. The District has attempted to insert these MMRP requirements into the various other Specification Sections that are related to the nature of each mitigation measure. This Section is included to provide a consolidated location for all of the CEQA requirements. Where measures are found in any of the Contract Documents that conflict with these measures, the more stringent measure shall apply.

1. Table 1 presents the mitigation measures identified for the Project. Each mitigation measure is numbered according to the topical section to which it pertains in the IS/MND. As an example, Mitigation measure AIR-1 is the first mitigation measure identified in the IS/MND for the Project.

   a. Elements of the MMRP which have been stricken out do not apply to this project.
   b. The first column of Table 1 identifies the mitigation measure from the IS/MND.
   c. The second column, entitled "Action and Implementation Timing," describes each mitigation measure.
   d. The third column, "Party Responsible for Monitoring," names the party ultimately responsible for ensuring that the mitigation measures are implemented.
   e. The fourth column "Action by Monitor," outlines the steps for monitoring the action identified in the mitigation measure.
   f. The fifth column entitled "Monitoring Timing," states the time the monitor must ensure that the mitigation measure has been implemented.
   g. The last column will be used by the District to ensure that individual mitigation measures have been monitored.
Table 1: Mitigation Monitoring and Reporting Program for Contra Costa College

<table>
<thead>
<tr>
<th>Recommended Mitigation Measures</th>
<th>Action and Implementation Timing</th>
<th>Party Responsible for Implementing Mitigation</th>
<th>Party Responsible for Monitoring</th>
<th>Action by Monitor</th>
<th>Monitoring Timing</th>
<th>Verification of Compliance Name/Date</th>
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</table>
| **AIR-Q: 1.** Consistent with guidance from the BAAQMD, the District shall require contractors to include emissions control measures in construction specifications for the project. The District shall verify the final construction specifications to verify that the requirements have been included prior to beginning grading and excavating activities for the project. The District shall verify via field inspection at least twice during construction that the measures are being implemented. The following actions are required:  
  - Idling time of diesel powered construction equipment shall be limited to 2 minutes;  
  - Alternative powered construction equipment (i.e., CNG, biodiesel, electric) shall be utilized when feasible;  
  - Add-on control devices shall be used such as diesel oxidation catalysts or particulate filters;  
  - Project construction shall be phased; and  
  - Operating hours of heavy duty equipment shall be minimized. |
| Implement the emission control measures listed in Mitigation Measure AIR-1 during construction |
| Contra Costa Community College District and construction contractor |
| Contra Costa Community College District |
| 1. Review final construction specifications to ensure all requirements listed in Mitigation Measure AIR-1 are included  
  2. Visit project site at least twice to verify that emission control measures are being implemented |
| 1. Before grading begins  
  2. During project construction |
| Name:  
  Date: |


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<tr>
<th>Recommended Mitigation Measures</th>
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<tbody>
<tr>
<td>AIR-2; AIR-2: Consistent with the guidance from the BAAQMD, the District shall include dust control measures in construction contracts and specifications for the project. The District shall verify via field inspection at least twice during construction of each project that the measures are being implemented. The following controls shall be implemented at all construction sites:</td>
<td>Implement the dust control measures listed in Mitigation Measure AIR-2 during construction</td>
<td>Contra Costa Community College District and construction contractor</td>
<td>Contra Costa Community College District</td>
<td>1. Review final construction specifications to ensure all requirements listed in Mitigation Measure AIR-2 are included 2. Visit project site at least twice to verify that dust control measures are being implemented</td>
<td>Before grading begins 1. During project construction</td>
<td>Name: Date:</td>
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</table>

- Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers to control dust;
- Cover all trucks hauling soil, land, and other loose materials or require all trucks to maintain at least two feet of freeboard;
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, inactive construction areas, and staging areas at construction sites;
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites; water sweepers shall vacuum up excess water to avoid runoff-related impacts to water quality;
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets;
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<td>AIR-2 Continued</td>
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<td>• Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.);</td>
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<td>• Install base rock at entryways for all existing trucks, and wash off the tires or tracks of all trucks and equipment in designated areas before leaving the site;</td>
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<td>• Limit traffic speeds on unpaved roads to 15 mph;</td>
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<td>• Install sandbags or other erosion control measures to prevent silt runoff to public roadways;</td>
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<td>• Replant vegetation in disturbed areas as quickly as possible; and</td>
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<td>• Suspend excavation and grading activity when sustained wind speeds exceed 25 mph. Sustained wind speed shall be determined by averaging observed values over a two-minute period. Wind monitoring by the construction manager shall be required at all times during excavation and grading activities.</td>
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<td>AIR-3a; Implement Mitigation Measure AIR-1</td>
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<td>See Mitigation Measure AIR-1</td>
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<td>AIR-3b; Implement Mitigation Measure AIR-2</td>
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<td>See Mitigation Measure AIR-2</td>
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<td><strong>BIO-1</strong>: Prior to construction, the District shall prepare and submit a Notification of Lake or Streambed Alteration application package (Form FG2023) to the California Department of Fish and Game (CDFG) for working within the riparian corridor of the Rheem Creek tributary. The application shall include a Riparian Restoration Plan prepared by a qualified restoration ecologist for any vegetation removal within the riparian corridor. This plan shall be reviewed and approved by the District. The amount of riparian vegetation trimmed, removed, or disturbed shall be kept to a minimum.</td>
<td>Submit a Notification of Lake or Streambed Alteration application package prior to construction of bridges</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that Notification of Lake or Streambed Alteration application package is submitted to California Department of Fish and Game</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td><strong>BIO-2a</strong>: To determine the extent of Corps jurisdiction at the proposed bridge locations, a qualified wetland scientist shall delineate waters of the U.S. in areas where bridges would be constructed using Corps methodology. The delineation shall be verified by the Corps.</td>
<td>Delineate waters of the U.S. in areas where bridges would be constructed using Corps methodology prior to construction of bridges</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Submit the delineation to the Corps for verification</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td><strong>BIO-2 Continued</strong></td>
<td>Obtain the appropriate federal and State permits for any construction activities located below OHWM of Rheem Creek prior to construction</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that appropriate federal and State permits are received</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td><strong>BIO-3:</strong> If feasible, all vegetation removal shall be conducted during the non-breeding season (i.e., August 1 to February 28) to avoid direct impacts to nesting birds. If such work is scheduled during the breeding season, a qualified ornithologist shall conduct a pre-construction survey to determine if any birds are nesting in the vegetation to be removed. The pre-construction survey shall be conducted within 15 days prior to the start of work from March though May (since there is higher potential for birds to initiate nesting during this period), and within 30 days prior to the start of work from June through July. If active nests are found during the survey, the biologist shall determine an appropriately sized buffer around the nest in which no work shall be allowed until the young have successfully fledged. The size of the nest buffer shall be determined by the biologist in consultation with the CDFG, and shall be based on the nesting species, its sensitivity to disturbance, and the expected types of disturbance.</td>
<td>Restrict vegetation removal activities to the period from August 1 to February 28. If not possible, have a qualified ornithologist create a buffer around nests in which no work shall be allowed until the young have successfully fledged prior to construction</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that construction is not taking place during breeding season, or ensure a proper buffer is created for nesting birds</td>
<td>Prior to construction</td>
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**V. CULTURAL RESOURCES**
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<tr>
<td>CULT-1: The Contra Costa Community College District shall inform its contractor(s) of the sensitivity of the project area for archaeological resources by including the following directive in contract documents: &quot;If prehistoric or historical archaeological deposits are discovered during project activities, all work within 25 feet of the discovery shall be redirected and a qualified archaeologist contacted to assess the situation, consult with agencies as appropriate, and make recommendations regarding the treatment of the</td>
<td>1. Include the directive described in Mitigation Measure CULT-1 in contract documents</td>
<td>1. Contra Costa Community College District</td>
<td>1. Contra Costa Community College District</td>
<td>1. Verify that the appropriate language has been incorporated in contract documents</td>
<td>1. Before grading begins</td>
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<td>2. Evaluate any archaeological resources discovered during project construction as described in CULT-1 and submit report of findings to the District and the NWIC</td>
<td>2. Construction contractor</td>
<td>2. Contra Costa Community College District</td>
<td>2. Visit project site and verify that measures are being implemented and that any reports are submitted to the NWIC</td>
<td>2. During project construction</td>
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<td>CULT-1 Continued</td>
<td>discovery. Project personnel should not collect or move any archaeological materials or human remains and associated materials. Archaeological resources can include flaked-stone tools (e.g., projectile points, knives, choppers) or obsidian, chert, basalt, or quartzite toolmaking debris; bone tools; culturally darkened soil (i.e., midden soil often containing heat-affected rock, ash and charcoal, shellfish remains, faunal bones, and cultural materials); and stone-milling equipment (e.g., mortars, pestles, handstones). Prehistoric archaeological sites often contain human remains. Historical materials can include wood, stone, concrete, or adobe footings, walls, and other structural remains; debris-filled wells or privies; and deposits of wood, glass, ceramics, metal, and other refuse.&quot;</td>
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<td>The Contra Costa Community College District shall verify that the language has been included in the contract documents.</td>
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<td>CULT-1 Continued</td>
<td>Adverse effects to archaeological deposits should be avoided by project activities. If such deposits cannot be avoided, they shall be evaluated for their California Register of Historical Resources eligibility to determine if such deposits qualify as &quot;historical resources&quot; under CEQA (CCR Section 15064.5(c)(1)). If the deposit is not eligible, a determination shall be made as to whether it qualifies as a &quot;unique archaeological resource&quot; under CEQA. If the deposit is neither a historical nor unique archaeological resource, avoidance is not necessary. If the deposit is eligible to the California Register, or is a unique archaeological resource, it will need to be avoided by adverse effects or such effects must be mitigated. Mitigation may consist of, but is not necessarily limited to, systematic recovery and analysis of archaeological deposits; recording the resource; preparation of a report of findings; and accessioning recovered archaeological materials at an appropriate curation facility. Public educational outreach may also be appropriate. Upon completion of the assessment, the archaeologist shall prepare a report documenting the assessment methods and results, and provide recommendations for the treatment of the archaeological materials discovered. The report shall be submitted to the Contra Costa Community College District and the Northwest Information Center.</td>
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<td>CULT-2: A qualified paleontologist shall monitor initial project ground-disturbing activities. The paleontologist can then determine whether further monitoring, periodic site reviews, or no further monitoring is appropriate. Paleontological monitoring shall include inspection of mechanically exposed, paleontologically sensitive geological formations underlying the project site. Samples of matrix shall be collected for processing, sorting, and microscopic examination to determine if microfossils are present within exposed geological formations. If paleontological resources are discovered during project activities, all work within 25 feet of the discovery shall be redirected until the paleontological monitor has assessed the situation and made recommendations regarding their treatment. It is recommended that adverse effects to paleontological resources be avoided by project activities. If avoidance is not feasible, the paleontological resources shall be evaluated for their significance. Paleontological resources are considered significant if they possess the possibility of providing new information regarding past life forms, paleoecology, stratigraphy, and geological formation processes. If the resources are not significant, avoidance is not necessary. If the resources are significant, they must be avoided by adverse effects, or such effects must be mitigated. Mitigation may include monitoring, recording the fossil locality, data recovery and analysis, a technical data recovery report, and accessioning the fossil material and technical report to a paleontological repository. Public educational outreach may also be appropriate.</td>
<td>1. Have a paleontologist monitor project ground-disturbing activities prior to construction</td>
<td>1. Contra Costa Community College District</td>
<td>1. Contra Costa Community College District</td>
<td>1. Verify that the appropriate language has been incorporated in contract documents</td>
<td>1. Before grading begins</td>
<td>Name: Date:</td>
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<td>2. Evaluate any paleontological resources discovered during project construction as described in CULT-2 and submit report of findings to the District and a paleontological repository</td>
<td>2. Construction contractor</td>
<td>2. Contra Costa Community College District</td>
<td>2. Visit project site and verify that measures are being implemented and that any reports are submitted to a paleontological repository</td>
<td>2. During project construction</td>
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<td>Recommended Mitigation Measures</td>
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<td>Upon completion of the paleontological monitoring, a report of findings with an appended, itemized inventory of specimens—as appropriate—should be prepared and submitted to an appropriate repository, such as the University of California Museum of Paleontology.</td>
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<td>CULT-3: If human remains are encountered, these remains shall be treated in accordance with Health and Safety Code Section 7050.5. The Contra Costa College District shall inform its contractor(s) of the cultural sensitivity of the project area for human remains by including the following directive in contract documents: “If human remains are encountered during project activities, work within 25 feet of the discovery shall be redirected and the County Coroner notified immediately. At the same time, an archaeologist shall be contacted to assess the situation and consult with agencies as appropriate. Project personnel shall not collect or move any human remains and associated materials. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Most Likely Descendent to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods.”</td>
<td>1. Include the directive described in Mitigation Measure CULT-3 in contract documents</td>
<td>1. Contra Costa Community College District</td>
<td>1. Contra Costa Community College District</td>
<td>1. Verify that the appropriate language has been incorporated in contract documents</td>
<td>1. Before grading begins</td>
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<td>2. Stop work within 25 feet of human remains discovered during project construction; prepare and submit report of findings to the District and NWIC.</td>
<td>2. Construction contractor</td>
<td>2. Contra Costa Community College District</td>
<td>2. Visit project site and verify that measures are being implemented and that any reports are submitted to NWIC</td>
<td>2. During project construction</td>
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<td>Recommended Mitigation Measures</td>
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<td>The Contra Costa Community College District shall verify that the language has been included in the contract documents. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the MLD. The report shall be submitted to the Contra Costa Community College District and the Northwest Information Center.</td>
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<td>VI. GEOLOGY AND SOILS</td>
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<td>GEO-1a: Prior to construction, a subsurface fault investigation shall be performed by a Certified Engineering Geologist or Geotechnical Engineer to identify potentially active fault traces within the footprint of proposed structures intended for human occupancy and 50 feet beyond. All future structures used or intended for supporting or sheltering humans for more than 2,000 person-hours per year shall be setback at least 50 feet from active faults, unless it is proven that there are no active branches of that fault in accordance with Section 3603 (d) of Appendix B of Special Report 42. In no case shall a structure for human habitation be constructed so as to cross the trace of an active fault. CCCCDFacilities staff and the Division of the State Architect (DSA) shall review the findings and recommendations of the subsurface fault investigation and verify that the project design has implemented appropriate setbacks from faults based on those findings prior to DSA project approval.</td>
<td>Complete a subsurface fault investigation prior to construction</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that subsurface fault investigation is completed</td>
<td>Prior to construction</td>
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<td>Recommended Mitigation Measures</td>
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| GEO-1b: The design of project improvements, including sidewalks, parking lots, and subsurface utilities, shall consider the potentially active and active fault traces and incorporate measures to ensure that potential damage due to rupture is minimized; utility (electricity, natural gas, telecommunications, water, sewer) crossings at potentially active and active fault traces shall be engineered with flexible connections or an equally effective alternate engineered solution so as to minimize damage from seismic activity and in accordance with the recommendations of subsection F of Appendix C of Special Publication 42. CCCCD Facilities staff and the DSA shall review and approve the design of project improvements and utilities prior to DSA project approval. | Consider the potentially active and active fault traces and incorporate measures to ensure damage due to rupture is minimized prior to construction | Contra Costa Community College District | Contra Costa Community College District | Verify with DSA that design measures minimize potential damage from rupture | Prior to construction | Name:  
Date: |
| GEO-2: Prior to construction, a geotechnical investigation shall be performed by a Certified Engineering Geologist or Geotechnical Engineer to identify potential liquefiable sediments southwest of and adjacent to Rheem Creek. If liquefiable sediments are identified at the project site, the District shall implement appropriate grading, drainage, and foundation design elements recommended by a Certified Engineering Geologist or Geotechnical Engineer and approved by the DSA to reduce the potential impact from liquefaction. | Perform a geotechnical investigation to identify potential liquefiable sediments by Rheem Creek | Contra Costa Community College District | Contra Costa Community College District | Verify that geotechnical investigation is completed | Prior to construction | Name:  
Date: |
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<th>Recommended Mitigation Measures</th>
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<th>Party Responsible for Implementing Mitigation</th>
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<th>Monitoring Timing</th>
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| GEO-3: A geotechnical investigation shall be performed by a Certified Engineering Geologist or Geotechnical Engineer to evaluate slope stability along the hillside portion of the project site. If slopes susceptible to seismic failure are identified at the project site, the District shall implement appropriate slope grading, drainage, and reinforcements as recommended by a Certified Engineering Geologist or Geotechnical Engineer and approved by the DSA to reduce the potential impact from slope failure. | Perform a geotechnical investigation to evaluate slope stability along the hillside portion of the project site | Contra Costa Community College District | Contra Costa Community College District | Verify that geotechnical investigation is completed | Prior to construction | Name:  
Date: |
| GEO-4: Implement Mitigation Measure HYD-1 | See Mitigation Measure HYD-1. | | | | | |
| GEO-5: Prior to construction, a geotechnical investigation shall be performed by a Certified Engineering Geologist or Geotechnical Engineer and the resulting report shall include evaluation of dynamic compaction potential at the project site. If soils susceptible to dynamic compaction are present the project site, the District shall implement proper grading and compaction measures as recommended in the final report and approved by the DSA to reduce the potential impacts from dynamic compaction to a less-than-significant level. | Perform a geotechnical investigation to identify the dynamic compaction potential at the project site | Contra Costa Community College District | Contra Costa Community College District | Verify that geotechnical investigation was completed | Prior to construction | Name:  
Date: |
| GEO-6: The District shall incorporate all recommendations of a final site-specific design-level geotechnical investigation as prepared by a Certified Engineering Geologist or Geotechnical Engineer into all development plans submitted for the project, including recommendations for grading, placement of fill materials, pretreatment of expansive soils, and avoidance of settlement and/or differential settlement of infrastructure and buildings. | Incorporate recommendations from geotechnical investigations into development plans | Contra Costa Community College District | Contra Costa Community College District | Verify that recommendations from geotechnical investigations are incorporated into all development plans | Prior to construction | Name:  
Date: |
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<th>Recommended Mitigation Measures</th>
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<th>Monitoring Timing</th>
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| GEO-8b: The District shall incorporate all recommendations of a final site-specific design-level geotechnical investigation as prepared by a Certified Engineering Geologist or Geotechnical Engineer into all development plans submitted for the project, including recommendations to protect iron, steel, metal and concrete from deterioration caused by contact with corrosive soils. | Incorporate recommendations from geotechnical investigations into development plans | Contra Costa Community College District | Contra Costa Community College District | Verify that recommendations from geotechnical investigations are incorporated into all development plans | Prior to construction | Name:  
Date: |

VII. HAZARDS AND HAZARDOUS MATERIALS

HAZ-1a: Prior to demolition of structures on the site, a comprehensive lead-based paint survey shall be conducted. If any lead-based paint is identified, it shall be removed from the site in accordance with all applicable regulations, including Occupational Safety and Health Administration (OSHA) guidelines. The District shall verify that the survey has been conducted before beginning demolition of the buildings.

Complete a lead-based paint survey as described in Mitigation Measure HAZ-1a

Contra Costa Community College District  
Contra Costa Community College District  
Verify that the survey has been conducted  
Before demolition begins  
Name:  
Date:

HAZ-1b: Prior to demolition of structures on the site, a complete Asbestos Hazard Emergency Response Act-Level Pre-Demolition Asbestos Survey shall be conducted. If asbestos is identified, a licensed asbestos abatement contractor shall be retained to abate identified asbestos-containing material in accordance with all applicable regulations. The District shall verify that the survey has been conducted before beginning demolition of the buildings.

Complete an asbestos survey as described in Mitigation Measure HAZ-1b

Contra Costa Community College District  
Contra Costa Community College District  
Verify that the survey has been conducted  
Before demolition begins  
Name:  
Date:
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<th>Recommended Mitigation Measures</th>
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<td><strong>VIII. HYDROLOGY AND WATER QUALITY</strong></td>
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<td>HYD1: As a condition of approval of the project plans, the District shall prepare a Storm Water Pollution Prevention Plan (SWPPP) designed to reduce potential impacts to surface water quality through the construction and operational periods of the project including all on- and off-site improvements. The SWPPP shall be submitted for approval to the Facilities Division of the CCCC and Division of the State Architect prior to issuance of project approvals. The SWPPP shall be maintained on-site and made available to Water Board staff upon request. The SWPPP shall include specific and detailed BMPs designed to mitigate construction-related and operational period pollutants. <strong>Construction Period:</strong> At a minimum, BMPs shall include practices to minimize the contact of construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) with stormwater. The SWPPP shall specify properly designed centralized storage areas that keep these materials out of the rain. An important component of the stormwater quality protection effort is the knowledge of the site supervisors and workers. To educate on-site personnel and maintain awareness of the importance of stormwater quality protection, site supervisors shall conduct regular tailgate meetings to discuss pollution prevention. The frequency of the meetings and required personnel attendance list shall be specified in the SWPPP.</td>
<td>Facilities Division of the District shall prepare and the Division of the State Architect shall approve a SWPPP that includes requirements listed in HYD1</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that the SWPPP has been prepared</td>
<td>Before construction begins</td>
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| HYD-1 *Continued*  
The SWPPP shall include operational-period BMPs that would result in treatment of an appropriate percentage of the runoff from the project including all on- and off-site improvements. The SWPPP shall include as many LID BMPs as feasible. CCCCD Facilities staff and the Division of the State Architect shall review and approve the SWPPP, including operational period BMPs, prior to approval of the project plans. | See Mitigation Measure HYD-1. | | | | | |
| HYD-2: Implement Mitigation Measure HYD-1. | See Mitigation Measure HYD-1. | | | | | |
| HYD-3: During design development and prior to construction of the bridges, a qualified engineering professional shall design the foundations and support structures for the proposed prefabricated pedestrian bridge(s) in such a way as to span the creek(s) from outside the 'top-of-bank' points of the stream banks, or: A Location Hydraulic Study (LHS) shall be prepared showing that any appurtenance structures required for the bridges will not exacerbate flooding up or downstream of the project site, result in bank or bottom scour, or accelerate bank erosion and result in degradation of water quality from creek damage. | Prepare a Location Hydraulic Study during project design | Contra Costa Community College District | Contra Costa Community College District | Verify that the Location Hydraulic Study has been prepared and the results considered in the project design | Before construction begins | Name:  

**Date:** |

<p>| HYD-4: Implement Mitigation Measure HYD-1. | See Mitigation Measure HYD-1. | | | | | |</p>
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<td>XI. NOISE</td>
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| **NOISE-1:** The project shall implement the following noise reduction measures:  
  - The District shall coordinate with the CCC campus administration and the construction contractor to schedule loud construction activities to less sensitive time periods.  
  - All heavy construction equipment used on the project site shall be maintained in good operating condition, with all internal combustion, engine-driven equipment fitted with intake and exhaust mufflers that are in good condition. | Implement the noise-reducing measures described in Mitigation Measure NOISE-1 | Construction contractor | Contra Costa Community College District | Visit project site and verify that noise control measures are being implemented | During project construction | Name:  
  **Date:** |
| **NOISE-2:** Implement Mitigation Measure NOISE-1. | See Mitigation Measure NOISE-1. |                                             |                                |                  |                  |                                     |
PART 2 – PRODUCTS - Not Used.

PART 3 – EXECUTION - Not Used.

END OF SECTION 01415
SECTION 01416
SPECIAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Division 1 Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. In Compliance with CEQA requirements, the District conducted an Initial Study to ascertain if the project may have an effect on the environment. The Initial Study identified potential impacts on the environment. However, all potential impacts of the proposed Project can be avoided or reduced to a less-than-significant level by implementation of the following mitigation measures. Contractor shall conform with the following mitigation measures, including but not limited to, the following:

1. Noise Control
2. Dust Control
3. Traffic Control
4. Spill Prevention, Control and Countermeasures
5. Tree Protection
6. Migratory Bird Protection
7. Cultural Resources Protection

B. In no case shall the restrictions identified in this Section limit the Contractor's responsibility for compliance with all Federal, state, and local safety ordinances and regulations.

1.3 NOISE CONTROL

A. The intent of this Section is to minimize construction noise within construction areas, lay-down areas, and communities adjacent to the construction site. To this end, the Contractor and all subcontractors, suppliers, and vendors, are required to comply with all applicable noise regulations, specification requirements, and the noise level limits specified herein.

B. The Contractor shall use equipment with efficient noise-suppression devices and employ other noise abatement measures such as enclosures and barriers necessary for the protection of the public, as necessary.

C. The Contractor shall schedule and conduct operations in a manner that will minimize, to the greatest extent feasible, the disturbance to the public in areas adjacent to the Work and to occupants of buildings in the vicinity of the Work.

D. Noise Control Measures. Contractor shall implement the following noise-control measures to reduce and control noise generated from construction, demolition, and construction related activities:

1. Restrict noise-producing construction activities to between 7:00 a.m. and 7:00 p.m. on weekdays. If construction is scheduled for Saturdays or Sundays to avoid disrupting college operations, restrict noise-producing construction activities to between 9:00 a.m.
and 5:00 p.m. Construction on Sundays shall be avoided, if possible, and there will be no construction on public holidays without prior written request submitted to and written approval returned by the District, at its sole discretion. A decision by the District to deny Sunday or holiday work shall not be deemed to cause a delay in the Contract Time. When activities must occur outside the hours specified above, conform with notification requirements of this Section and utilize local barriers around equipment and other noise attenuating devices if necessary to limit noise to acceptable levels.

2. Comply with all City of San Pablo requirements regarding both allowable hours of Work and noise level limitations.

3. All construction equipment shall have appropriate mufflers, intake silencers, and other required noise-control features, shall be properly maintained and in compliance with State standards.

4. Vehicles and other gas or diesel powered equipment shall be prohibited from unnecessary warming up, idling, and engine revving.

5. Impact tools shall utilize “quiet technology” to minimize noise.

E. Secure written permission from Construction Manager at least three (3) working days prior to using noisy and vibratory equipment, such as jackhammers, concrete saws, impact tools, and high frequency electrical equipment. Cooperate with District if the use of noisy equipment becomes objectionable to college employees and/or students.

F. The work must be conducted so that nearby residents and college operations in surrounding facilities and classrooms will not be disturbed at any time during any phase of the Work including, but not limited to, the following requirements:

1. Do not use loud vocal or mechanical signals. Use of outside speakers, loud radios and similar devices are prohibited.

2. Work shall be performed in a manner to prevent nuisance conditions such as noise which exhibits a specific audible frequency or tone (e.g., backup alarms, poorly maintained equipment, brake squeal, etc.) or impact noise (e.g., jackhammers, hoe rams). The District will make any final interpretation concerning whether or not nuisance noise conditions exist. Only the District representatives and specifically designated College representatives have the authority to stop the Work until nuisance noise conditions are resolved, without additional Contract Time or compensation for the Contractor.

1.4 DUST CONTROL

A. Contractor shall implement dust control measures to protect air quality during construction to control dust emissions generated during construction, implement the following Bay Area Air Quality Management District (BAAQMD) measures for construction emissions of particulate matter over 10 microns in size (PM10).

1.5 TRAFFIC CONTROL

A. Contractor shall implement traffic control to minimize the effects of construction traffic on the campus and surrounding residential areas, as appropriate.

B. Contractor shall notify the District, Architect, Construction Manager, Project Inspector, Campus Police Department, city and county agencies, as applicable, a minimum of five (5) working days in advance of performing work which necessitates closing or interfering with traffic on public
throughfares, parking areas, driveways and walks. Obtain written permission prior to
effecting such closures and interruptions.

1.6 **SPILL PREVENTION, CONTROL AND COUNTERMEASURES**

A. Contractor shall implement Spill Prevention, Control and Countermeasures to minimize the
potential for and effects from spills of hazardous, toxic or petroleum substances during
construction and demolition activities.

B. The federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil
spill that includes any of the following:

1. Violates applicable water quality standards.
2. Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
3. Causes a sludge or emulsion to be deposited beneath the surface of the water or
   adjoining shorelines.

C. If a spill is reportable, notify the District’s Representative and take action to contact
appropriate safety and clean-up crews.

1. A written description of reportable releases must be submitted to the District’s
   Representative and to the San Francisco Bay Regional Water Quality Control Board
   (RWQCB). This submittal must contain a description of the spill, including the type of
   material and an estimate of the amount spilled, the date of the release, an explanation of
   why the spill occurred and a description of the steps taken to prevent and control future
   releases. Document the releases on a spill report form.

2. If a reportable spill has occurred and results determine that project activities have
   adversely affected surface water or groundwater quality, the District will engage a
   registered environmental assessor at Contractor’s expense for a detailed analysis to
   identify the likely cause of contamination. This analysis will conform to American Society
   for Testing and Materials (ASTM) standards and will include recommendations for
   reducing or eliminating the source or mechanisms of contamination.

3. Based on this analysis, the Contractor shall select and implement measures to control
   contamination, with a performance standard that groundwater quality must be returned
to baseline conditions. These measures will be subject to approval by the District.

1.7 **TREE PROTECTION**

A. Definitions:

1. Dripline: If applicable, the area on the ground from the trunk of any tree to the point
directly below the outermost tips of the foliage of that tree.

2. Root Protection Zone (“RPZ”): If applicable, the areas enclosed with tree protection
   fencing as designated on the drawing(s).

3. Tree damage: If applicable, tree damage shall include, but not limited to, the following:
   Significant injury to the root system or other parts of a tree including burning, application
   of toxic substances, damaging through contact with equipment or machinery, changing
   the natural grade within the Dripline or RPZ, compacting the soil within the Dripline or
   RPZ, interfering with the normal water requirements of the tree, unauthorized trenching
   or excavating within the Dripline or RPZ, or unauthorized removal of more than 1/3 of
   the live wood, foliage or roots.
B. Root Protection: No storage of materials or equipment will be allowed within the Dripline. Whenever possible, excavation shall be on a radial line, diverging from the tree trunk. For items of Work delayed materially beyond Date of Substantial Completion, provide update submittal within 14 Days after acceptance, listing date of acceptance as start of warranty period.

C. Exposure to harmful substances: No storage or dumping of any substances that may be harmful to trees shall occur at any location on the Site.

D. Where construction is to be performed in the vicinity of trees and shrubbery, the Work shall be carried on in a manner that will cause minimum damage. District will designate trees that are to be removed. Under no circumstances are additional trees to be removed without written permission from District. Trees and shrubbery that are not to be removed shall be protected from injury or damage resulting from Contractor’s operations.

E. Any tree that is removed without District’s permission or is irreparably damaged, in the opinion of District, shall cost Contractor in damages [$100.00] per square inch of cross section, measured at 4 1/2 feet above ground, but not less than [$250.00], such cost to be deducted from monies due or to become due under the Contract. If tree protection is not performed or is not performed adequately and District determines that a tree has been irreparably damaged, Contractor shall pay the same amount of damages as for unauthorized removal of a tree. Contractor shall immediately report all tree damage to District, so that District may determine applicable damages.

1.8 MIGRATORY BIRD PROTECTION

A. If applicable, conduct vegetation and tree removal outside of the migratory bird nesting season. The typical nesting season for migratory birds in this part of California is March 1st through July 31.

B. If vegetation and tree removal must take place during the nesting season, these activities shall be preceded by a survey for nesting migratory birds by the District’s qualified ornithologist. If bird nests are discovered in the trees or on the buildings, they shall not be removed while the nest(s) are active.

1.9 CULTURAL RESOURCES PROTECTION

A. If buried cultural resources, such as chipped or ground stone, historic debris, building foundations or human bones or paleontological resources are discovered inadvertently during ground-disturbing activities, Contractor shall avoid any further disturbance of the materials and immediately discontinue earthwork within 100 feet of the find. Contractor shall notify District’s Representative immediately upon encountering cultural resources. Contractor shall be prepared to move on to another location or phase of work, allowing sufficient time for District’s Representative to evaluate the nature and significance of the find and implement appropriate management procedures.

B. In the event that prehistoric human remains are encountered, further excavation or disturbance of the site shall cease immediately, pursuant to Health and Safety Code 7050.5. Contractor shall notify District’s Representative immediately upon encountering human remains. Contractor shall move on to another location or phase of Work to allow proper assessment of the situation.

C. If human remains of Native American origin are discovered during project construction, it will be necessary to comply with State laws relating to the disposition of Native American burials,
which fall under the jurisdiction of the NAHC (Public Resources Code (PRC) Section 5097. Consequently, if any human remains are discovered or recognized in any location other than a dedicated cemetery, there will be no further excavation or disturbance of the site or any nearby areas reasonably suspected to overlie adjacent human remains:

1. Until the Contra Costa County Coroner has been informed and has determined that no investigation of the cause of death is required;
2. If the remains are of Native American origin;
   a. The descendants of the deceased Native American(s) have made a recommendation to the landowner or the person responsible for the excavation work regarding means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC Section 5097.98 or
   b. The NAHC has been unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the NAHC.

PART 2 – PRODUCTS - Not Used.

PART 3 – EXECUTION - Not Used.

END OF SECTION 01416
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SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this section without limitation.

1.2 REQUIRED TEMPORARY FACILITIES AND CONTROLS
A. Contractor shall provide and maintain all temporary facilities, utilities, and controls as required to perform the Work and as required herein. Materials, installation, and maintenance of temporary utilities and facilities shall be in compliance with all applicable local and State regulatory requirements. Remove temporary utilities and facilities, including associated materials and equipment, when no longer required. Restore and recondition existing facilities used during construction and areas of the Site, roads, driveways, parking lots, landscaping, and any other existing improvements either damaged or disturbed by the installation of temporary facilities or utilities to their original condition. Remove and properly dispose of debris resulting from removal and reconditioning operations.

B. Contractor shall furnish and install requirements for temporary utilities, facilities, security, and protection, which include but are not limited to the following:

1. Temporary Electric Power and Lighting
   a. The District will make available existing electric power sources in its distribution system to facilitate the Contractor’s completion of the Work. However, the installation and removal of all temporary distributions of power to these existing facilities throughout the Site shall be the sole responsibility of the Contractor without adjustment to the Contract Sum or the Contract Time. The Contract Sum shall not be adjusted on account of any disruption, reduction or elimination of electrical power service to the Site, unless the same is caused by the District’s non-payment of undisputed utility charges for such electrical power service. Contractor shall provide power outlets for construction operations, with branch wiring and distribution boxes located as required to complete the Work.
   b. Contractor shall provide and maintain electrical power at the Site for construction purposes, for temporary facilities and trailers, and for any other site offices or trailers required by the Contract Documents. Contractor shall provide all necessary wiring and appurtenances for connection to District’s system. Connect to District power at location(s) as directed by District.
   c. Contractor shall provide and maintain distribution of temporary electrical power and lighting to the Work, and for use by the Project Inspector and District Project Manager where applicable.
   d. Contractor shall provide temporary power main service disconnect and over current protection at convenient locations and as required by governing codes.
e. The Contractor shall be responsible for providing temporary facilities as required to deliver power service from the point of connection to the point(s) of intended use.

f. Contractor shall verify characteristics of District power available for temporary service use, and provide all transformers and/or other equipment necessary to modify District power for temporary use by the Contractor. Contractor shall pay all costs associated with any necessary modifications to District power for temporary use on the Work.

g. The Contractor shall provide, install, and maintain temporary electrical lighting wherever necessary to provide illumination for the proper performance and/or observation of the Work. Where required, a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work shall be provided.

2. Temporary Communications/Telephone

a. Contractor shall provide, maintain, and pay for all required communications and data services (including without limitation telephone, facsimile, e-mail and internet) to all Project field offices to include a multi-function printer, copier, scanner, fax unit commencing at the time of Project mobilization, including all installation, connection, and monthly charges. The installation and removal of all temporary telephone and data distribution shall be the sole responsibility of the Contractor without adjustment of the Contract Sum or the Contract Time. Routing of the new lines shall be acceptable to the District.

b. Contractor shall provide, maintain and pay for telephone, data/internet and facsimile (FAX) machine service to field offices at time of project mobilization and for the duration of the project. Contractor to pay costs for telephone installation, telephones, internet access, maintenance services and removal.

c. Not used.

d. Coin operated phones are not acceptable.

e. Contractor to provide a list of important telephone numbers at each telephone on the site offices including, but not limited to the following:

   i) Police and Fire Departments
   ii) Campus Police
   iii) Ambulance Service
   iv) Contractor’s home office
   v) All Principal Subcontractors’ field and home offices
   vi) Architect’s office
   vii) Engineer’s office
   viii) District office
   ix) Project Manager
   x) Project Inspector
   xi) Building & Grounds Department
   xii) Testing Laboratory
f. Provide superintendent with cellular telephone for use when away from field office.

3. Temporary Water

a. The District will furnish and pay for water during the course of the work to the extent water is available on the Site. The Contractor shall be responsible for providing all temporary facilities required to deliver District water from the point of connection to point of intended use on the Project.

b. Contractor shall be allowed to utilize water from the District for domestic use only. Water shall not be provided nor used for dust control, street cleaning, cleaning tools, or vehicle washing. Water used for such purposes shall be provided by the Contractor at its expense.

c. Contractor shall provide and maintain necessary temporary water supply connections, pipes, hoses, nozzles, and fittings required. Before final acceptance, all temporary water supply components installed by Contractor shall be removed in a manner approved by District's Representative.

d. Unnecessary waste of water will not be permitted. Special hydrant wrenches shall be used for opening and closing fire hydrants, in no case shall pipe wrenches be used for this purpose. Obtain approval of governing agency prior to opening any fire hydrant.

e. Contractor shall provide and use backflow preventers on water lines at point of connection to any District water supply. Backflow preventers shall comply with requirements of California Uniform Plumbing Code. The installation and removal of all temporary backflow preventers on the Site shall be the sole responsibility of the Contractor without any adjustment to either the Contract Sum or the Contract Time. Before final acceptance, all temporary connections and piping installed by Contractor shall be removed in a manner approved by District's Representative.

f. Contractor shall provide and make potable water available for human consumption. Contractor shall provide and maintain suitable quality water service required for construction operations.

4. Temporary Fences

a. Temporary Fencing: Contractor shall provide temporary fencing around construction areas for safety and protection. Provide chain link fencing not less than eight (8) feet in height, complete with metal posts and required bracing, anchorage, visual screening, and with truck and pedestrian gates. All vehicle and pedestrian gates and openings shall have gates secured after hours of operation.

b. Contractor shall provide padlocks used for securing all gates. Padlocks shall be designed to prohibit cutting of shackle. Contractor shall coordinate keying strategy with District.

c. Contractor shall be responsible for locking gates and shall be secured with minimum 3/8 inch thick, 30 grade coil chain, minimum 5/16 inch cable. Gates shall be kept closed and locked at all times when not in use.

d. All existing fences affected by the Work shall be maintained by Contractor until Final Completion of Project. Fences which interfere with construction operations shall not be relocated or dismantled until District gives written permission to do so, and the
timing of fence relocation or dismantling has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Site Enclosure Fence: Contractor shall furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gate.

e. Contractor will be responsible for maintaining security by limiting number of keys and restricting distribution to authorized personnel.

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 violation of security.

g. Contractor shall provide secure lockup for stored materials and equipment which are of value or attractive for theft.

h. Contractor shall be responsible for project security for materials, tools, equipment, supplies and completed and partially completed Work.

i. On completion of the Work across any tract of land, Contractor shall restore all fences to their original or to a better condition, and to their original locations.

5. Temporary Protection of Public and Private Property

a. Contractor shall protect, shore, brace, support and maintain all existing underground utilities including but not limited to the following: all pipes, conduits, drains and other underground construction uncovered or otherwise affected by construction operations.

b. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences and other surfaces structures affected by construction operations, together with all sod and shrubs in yards, planting areas, and medians, shall be restored to their original condition, wherever affected by construction operations. All replacements shall be made with new materials.

c. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work, Site or any part thereof, whether by Contractor or Subcontractors. Contractor shall be solely responsible without adjustment of the Contract Sum or the Contract Time to make satisfactory and acceptable arrangements with the District, or the agency or authority having jurisdiction over the damaged property, concerning its repair or replacement or payment of costs incurred in connection with the damage.

d. All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

6. Temporary Sanitary Facilities

a. Contractor shall provide and maintain temporary sanitary toilets for use of all workers throughout the course of the Work. At a minimum, sanitary facilities shall be located at the trailer site, Contractor staging area(s) and adjacent to Work areas.
b. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the Project, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least (1) toilet will be furnished for each (15) persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the Site.

c. Contractor shall comply with all minimum requirements of the Contra Costa Health Department or other public agency having jurisdiction.

d. Maintain temporary facilities in a sanitary condition at all times during the Project.

e. Contractor will keep sanitary facilities free from graffiti.

f. Use of toilet facilities in the Work under construction shall not be permitted.

g. Contractor is not permitted to use existing Campus toilet facilities.

h. All portable toilets shall be located within fenced areas of the Project Site.

i. Contractor shall be responsible for providing access to the temporary toilet facilities.

7. **Temporary Barriers and Enclosures**

a. Contractor shall provide barriers to prevent unauthorized entry to construction areas to allow for District’s use of the Site, and to protect existing facilities and adjacent improvements from damage during construction operations.

b. Contractor shall provide barricades as required by the Contract Documents, governing agencies, and/or field conditions in order to protect public access pathways to existing buildings scheduled to remain open during any Phase of the Work.

c. Contractor shall protect vehicular traffic, stored materials, Site, and existing structures from damage.

d. Contractor shall provide and maintain temporary enclosures to prevent public entry to any construction area, and to protect all persons using other existing buildings and portions of the Site and/or Premises Contractor shall maintain safe access to all existing facilities to remain in operation during any phase of the Work.

8. **Temporary Pollution Control**

a. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. No sanitary wastes shall be permitted to enter any drain or watercourses other than sanitary sewers. No sediment, debris or other substance shall be permitted to enter sanitary sewers without authorization of the receiving sanitary sewer service and all possible Best Management Practices (BMPs) shall be taken to prevent such materials from entering any drain to watercourse. Rate of discharge for storm water may be not increased by the Project during or following construction.

b. In the event that dewatering of excavations is required, Contractor shall obtain the necessary approval and permits for discharge of the dewatering effluent from the local jurisdiction. Contractor shall be responsible for assuring that water quality of such discharge meets the appropriate permit requirements prior to any discharge.

c. Contractor shall comply with the District’s Storm Water Pollution Prevention Plan, if applicable for this Project.
9. Construction Aids
   a. Contractor shall furnish, install, maintain and operate all construction aids as required for the performance of the Work. Such construction aids include, but are not limited to, elevators and hoists, cranes, temporary enclosures, swing staging, scaffolding, and temporary stairs.

10. Erosion Control
   a. Contractor shall comply with the District Storm Water Pollution Prevention Plan for this Project if applicable.
   b. Contractor shall prevent soil erosion on the Site and adjacent property resulting from its construction activities to the maximum extent practical, including implementation of Best Management practices. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation or other operations that will disturb the natural protection.
   c. Work shall be scheduled to expose areas subject to erosion for the shortest possible time and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage, temporary construction buildings and temporary Field office buildings shall be located and construction traffic routed to minimize erosion. Contractor shall provide temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

11. Vehicular and Pedestrian Traffic Controls
   a. The Campus is an active site, with vehicular and pedestrian traffic occurring at all times of the day and all days of the week. Contractors shall coordinate with District’s Representative concerning vehicular traffic associated with the construction in order to minimize disruption to college operations. Delivery trucks and large equipment shall enter the Contractors access gate and shall use the route mutually agreed upon between District and Contractor. Contractor shall provide signage directing construction and delivery traffic to this gate. Contractor shall provide information regarding sign types, size, material, text and locations to be reviewed and approved by the District Representative, and the Campus prior to installation. See Article 12 below for additional requirements.
   b. Contractor shall keep all required Fire District and emergency vehicle access paths free from obstruction at all times during the Project.

12. Temporary Signage
   a. Sign must be reviewed and approved by the District and the Campus prior to installation. Contractor shall use an experienced sign company to produce all temporary signs. Install signs where indicated in Contract Documents, and as required by the District. Unauthorized signs are not permitted.
   b. Contractor shall provide temporary directional way-finding signs around the Project site to guide faculty, students, and visitors to safely navigate around construction activities at the Project site and to warn faculty, students, and visitors of potential safety hazards. Contractor shall provide a minimum of 20 way finding signs on metal posts to match existing at the Project Site. A sample way-finding sign is attached at the end of this section that provides basic dimensions, materials, backgrounds and
related information. However, final proposed signs by Contractor shall be reviewed and approved by the District and Campus prior to fabrication and installation.

c. In addition to way-finding signs, additional safety sign types shall include, but not be limited to: Danger/Construction Area/No Trespassing; Caution/Demolition Work in Progress; Do Not Enter/Authorized Personnel Only; Warning/Hard Hat Required Beyond this Point; Eye Protection Required Beyond this Point; Danger/Flammable Materials/ No Smoking Within 25 Feet; Danger/Keep Gate Closed; Caution/Laser Operation in Use; Caution/Overhead Work in Progress; Power Actuated Tools in Use; All Visitors Report to Job Trailer; Eye Wash Station; Authorized Access Only; Danger/No Trespassing; Caution/Construction Traffic; Caution/Pedestrian Traffic; Building Closed, and Contractor Deliveries. All signs shall be in both English and Spanish; and shall be in a quantity needed and applicable as determined by the District. A sample safety sign type is attached at the end of this section for general guidance, but final proposed signs by Contractor shall be reviewed and approved by the District and Campus prior to fabrication and installation.

d. Contractor shall maintain and touch-up signs so they are legible at all times.

13. Temporary Heat and Ventilation

a. Provide temporary heat as required to maintain adequate environmental conditions to facilitate progress of the work, to meet specified minimum environmental conditions for the Work and to protect materials and finishes from damage due to improper temperature and humidity conditions.

b. Portable heaters shall be standard units complete with controls, appropriate safety features, and bear testing lab approval markings.

c. Provide adequate forced ventilation of enclosed areas as required for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors and gases.

d. HVAC Equipment: Unless District authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   i) Use of gasoline-burning space heater, open-flame heater or salamander-type heating units is prohibited.
   ii) Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

PART 2 - PRODUCTS

2.1 MATERIALS - Not used

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Locate Contractor facilities where they will serve Project adequately and result in minimum interference with performance of Work. Relocate and modify facilities as required by progress of the Work during entire project including all phases of project.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Contractor shall verify and coordinate all relocation of facilities with the District Construction Manager.

3.2 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.
   1. Where appropriate, 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.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion and acceptance by the District.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use a permanent facility or no later than Final 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.

14. Materials and facilities that constitute temporary facilities are property of Contractor. District reserves the right to take possession of Project Identification signs at no cost to the District.

15. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at temporary entrances, as required by authorities having jurisdiction.

16. Clean and renovate permanent facilities used during construction period prior to Final Completion.

END OF SECTION 01500
WARNING: CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM ARE PRESENT IN YOUR WORK AREA

Aphalt, sand diesel engine exhaust and other materials in your work area contain chemicals known to the state of California to cause cancer and/or reproductive harm. Exposure to some or all of these chemicals occurs during paving operations and related activities. Always familiarize yourself with the hazards of the materials and equipment you are using and follow the precautions indicated on the product labels, Material Safety Data Sheets and your health and safety training program.

WARNING ADVENTENCIA
NO SMOKING OR EATING INSIDE BUILDING
NO FUMAR O COMER DENTRO DEL EDIFICIO

DANGER PELIGRO
OVERHEAD POWER LINES LINEAS ELECTRICAS ELEVADAS

CAUTION CUIDADO
OVERHEAD WORK IN PROGRESS TRABAJO EN PROGRESO-ARRIBA
SECTION 01505
CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. The District has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.

B. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.

1.3 WASTE MANAGEMENT GOALS FOR THE PROJECT

A. The District has established that this Project shall minimize the creation of construction and demolition waste, and shall divert a minimum of 75% of Project generated waste from landfills. Factors that contribute to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination, shall be minimized. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized. Both recycled and waste need to be logged and documented by volume and weight.

B. Diversion Goals: A minimum 75% of total Project waste shall be diverted from landfill. The following waste categories, at a minimum, shall be diverted from landfill. These materials include, but not limited to:

1. Landscape and land clearing debris (green wood materials)
2. Asphalt pavement
3. Gravel and aggregate products
4. Concrete
5. Masonry scrap and rubble (brick, concrete, masonry, stone)
6. Metals (ferrous and nonferrous)
7. Clean wood (dimensional lumber, sheet goods, millwork, scrap, pallets)
8. Plastics (films, containers, PVC products, polyethylene products)
9. Asphalt/Bituminous roofing
10. Insulation Materials
11. Glass (un-tempered)
12. Door and window assemblies
13. Carpet and carpet pad
14. Fibrous acoustic materials
15. Ceiling Tiles
16. Plumbing fixtures and equipment
17. Mechanical equipment
18. Lighting fixtures and electrical components  
19. Cardboard packing and packaging  
20. Furniture  
21. Sheet Rock  
22. Electronic Waste  
23. Universal Waste  
24. Paper  

1.4 REFERENCES AND RESOURCES  
A. This information is provided for Contractor’s convenience only, and the District does not warrant its accuracy. County specific information is available on the Contra Costa County Waste Reduction and Recycling web page at http://www.co.contra-costacounty.ca.us/depart/cd/recycle/index.html. Additional information may also be found at the County conservation web page at http://www.cccounty.us/index.aspx?NID=285. Refer to the Contra Costa County Builder’s Guide to Reuse & Recycling and the Contra Costa County Recycling Guide.  
B. The following sources provided for references:  
   1. BuildingGreen.com  
   2. California Integrated Waste Management Board  
   3. EPA Office of Solid Waste and Energy Response  

1.5 QUALITY ASSURANCE:  
A. Regulatory Requirements. Comply with applicable requirements of the State of California, local ordinances and regulations concerning management of construction, clearing, and inert materials.  
B. Disposal Site, Recyclers and Waste Materials Processors. Use only facilities properly permitted by the State of California, and/or by local authorities where applicable.  

1.6 WASTE DIVERSION DOCUMENTATION  
A. Provide the District with delivery receipts for the recovered materials and waste materials sent to the permitted recycling facilities, processing facilities, or landfill with the following information on a form to be approved by the District:  
   1. Name of firm accepting the recovered materials or waste materials  
   2. Specify type of facility (e.g. retail facility, recycler, processor, Class III landfill, MRF)  
   3. Location of the facility  
   4. Type of materials  
   5. Net weights (or volume) of each type of material  
   6. Date of delivery  

B. Application for Progress Payments: Contractor shall submit with each Application for Progress Payment a Summary of the project waste generated. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The District
and its representatives shall not be responsible for delaying Progress Payments. With each Application for Payment, submit required Progress Documentation, including:

1. manifest,
2. weight tickets,
3. receipts,
4. and invoices specifically identifying the project and waste material.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING

A. Site Storage

1. Remove materials for recycling and recovery from the work locations to approved containers or storage area as required. Failure to remove waste or recovered materials will be considered cause for withholding payment and termination of Contract.

2. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, also provide a sorting area and necessary storage containers.

3. Change-out loaded containers for empty containers, as demand requires.

4. If recovered materials are stored on-site for project duration provide adequate security from pilferage.

B. Handling

1. Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesive, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

2. Insure all recovered materials are made safe for handling and storage.

3. If the contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers. In such case, request resolution by the District for disposal of the contaminated material. Directions from the District do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

3.2 PROJECT CONDITIONS

A. Site Condition:

1. Signs and instructions should be clear, and easy to understand. All recycling containers should be clearly labeled and lists of acceptable and unacceptable materials will be posted throughout the site. Whenever possible, they should be in multiple-languages, especially in Spanish, and in graphic symbols.

2. The Contractor shall ensure the safety of all personnel involved in the waste management process.
3. A site management plan shall be created by the Contractor including: work areas, materials processing areas, materials storage and disposal areas, worker hand-washing and changing stations, first aid and medical information.

END OF SECTION 01505
SECTION 01 73 10
CUTTING AND PATCHING FOR RoofING AND PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching of existing roofing, cement plaster.

B. Related Sections include the following:
   1. Applicable Divisions 02 through 16 Sections for specific material requirements for cutting and patching work associated with the Work in those Sections.
   2. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and trim associated with cutting and patching of existing membrane roofing.

1.2 DEFINITIONS

A. Cutting: Removal of in-place 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.

1.3 SUBMITTALS

A. Cutting and Patching Plan: Submit a plan describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
   3. Products: List products to be used and firms or entities that will perform the Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure, for review by the Structural Engineer.
   6. Architect's Approval: Obtain approval of cutting and patching plan before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 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. Operating elements include, but are not limited to, the following:
   1. Primary operational systems and equipment.
   2. Air or smoke barriers.
   3. Fire-suppression systems.
   4. Mechanical systems piping and ducts.
   5. Control systems.
   6. Communication systems.
   7. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous 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. Miscellaneous elements include, but are not limited to, the following:
   1. Water, moisture, or vapor barriers.
   2. Membranes and flashings.
   3. Exterior wall construction.
   4. Equipment supports.

D. Visual Requirements: 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.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties. Arrange for inspection by factory-authorized service representatives of each affected system, if required as a condition for maintaining existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. Except for roofing materials, if identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.
2. Cutting and Patching of Existing Roofing Materials: All new roofing system materials including, but not limited to insulation, adhesives, cover boards, accessories, flashings, and other materials used in the assembly, shall match existing system materials.

PART 3 - EXECUTION

3.1 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 in-place finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place 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.

3.3 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 in-place 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 in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, 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. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Roofing: Neatly cut existing roofing plies, stripping, flashings, insulation, cover boards, and other items as required to receive new work, in accordance with...
roofing manufacturer's written recommendations, and using industry standard means and methods.

4. Cement Plaster: Demolish, in small sections, to a minimum of 1'-6" beyond new openings, or as otherwise required to provide new framing, sheathing, underlayment, flashing materials, and cement plaster system. Dislodge existing cement plaster without damage to underlying sheathing, metal lath, building paper, and other lathing materials in order to provide a suitable substrate for new cement plaster system.

5. 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.

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. Provide an even surface of uniform finish, color, texture, 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. Patch components in a manner that restores enclosure to a weathertight condition.
   a. Roofing: Integrate repairs into existing roofing system in accordance with roofing manufacturer's written recommendations, and using industry standard means and methods. Create permanent seal between repair work and existing roof system. Install sheet metal flashings as specified in Division 07 Section "Sheet Metal Fascia."
   b. Sheet Metal Fascia: Install sheet metal fascia as specified in Division 07 Section "Sheet Metal Flashing and Trim."
   c. Cement Plaster: Integrate repairs into existing cement plaster system in accordance with industry-standard written recommendations, the PCA Plaster (Stucco) Manual, industry-standard means and methods, and California Building Code requirements.

D. Cleaning: Clean areas and spaces where cutting and patching are performed.

END OF SECTION 01731
SECTION 01785
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY

A. This section includes administrative and procedural requirements for Operation and Maintenance (O&M) data and documents.

1.3 FORMAT

A. Contractor shall compile O&M manuals for all building equipment including mechanical, plumbing and electrical equipment, commissioned or not.

B. Submit O&M Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 00700, Contract General Conditions.

1. Package Quality. Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

2. Package Content. Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

3. Changes to Submittals. Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Architect or District Project Manager for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.4 SYSTEMS COVERED

A. The Contractor shall supply the required information for all systems identified in Contract Documents. A separate manual or chapter shall be provided for all new equipment or systems referenced in the Contract Documents.

1.5 COMPUTER PROGRAMS

A. When any equipment requires operation by computer programs, submit copy of original program on CD, with a hard-copy and an electronic copy (Adobe PDF format) of all user
1.6 **SUPPLEMENTAL DATA**

A. Contractor shall prepare written text and/or special drawings to provide necessary information when manufacturer’s standard printed data is not available and/or additional information is necessary for a proper understanding and operation and maintenance of equipment or systems, or when it is necessary to supplement data included in the manual or Project documents.

1.7 **SCHEDULE OF INFORMATION FOR OPERATION AND MAINTENANCE DATA PACKAGES**

A. Supply all of the following, when and where applicable, for each O&M data package:

1. Safety precautions
2. Operator prestart
3. Startup, shutdown, and post-shutdown procedures
4. Normal operations
5. Emergency operations
6. Operator service requirements
7. Environmental conditions
8. Lubrication data
9. Preventive maintenance plan and schedule
10. Cleaning recommendations
11. Troubleshooting guides and diagnostic techniques
12. Wiring diagrams and control diagrams
13. Maintenance and repair procedures
14. Removal and replacement instructions
15. Spare parts and supply list
16. Special tools required to service or maintain the equipment
17. Corrective maintenance man-hours
18. Product submittal data
19. O&M submittal data
20. Parts identification
21. Warranty information
22. Personnel training requirements
23. Testing equipment and special tool information
24. Testing and performance data
25. Installing Subcontractor information

**PART 2 - PRODUCTS - Not Used.**

**PART 3 - EXECUTION - Not Used.**

**END OF SECTION 01785**
SECTION 01820

DEMOnSTRATION AND TRAINING PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Specification Sections shall apply to this Section without limitation.

1.2 SUMMARY
   A. This Section includes administrative and procedural requirements for instructing District’s personnel, including the following:
      1. Demonstration of operation of systems, subsystems, and equipment
      2. Training in operation and maintenance of systems, subsystems, and equipment
      3. Demonstration and training videos

1.3 SUBMITTALS
   A. At completion of training, provide two (2) complete training manuals for the District’s use.
   B. Attendance Record: For each training module, provide list of participants and length of instruction time.

1.4 QUALITY ASSURANCE
   A. Instructor Qualifications: A factory-authorized service representative or District approved equivalent, complying with requirements in Section 01400 (Quality Control Requirements), and technical specification sections where required. Service representative shall be experienced in operation and maintenance procedures and training for Project specific systems and equipment.
   B. Contractor shall coordinate instruction schedule and verify availability of educational materials, instructor’s personnel, audiovisual equipment, and facilities needed to avoid delays.
   C. For instruction that must occur outdoors, review weather forecast and provide alternatives if conditions are unfavorable.

1.5 COORDINATION
   A. Contractor shall coordinate instruction schedule with District Construction Manager.
   B. Provide written notice ten (10) working days in advance to District Construction Manager, and Architect prior to any scheduling instruction sessions. District Construction Manager shall furnish Contractor with names and positions of intended participants.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM
   A. Program Structure: Contractor shall develop and provide instruction program that includes group training modules for each system and equipment not part of a system, but included in individual Specification Sections.
B. Training Modules: Contractor shall develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Review basis of system design
2. Operational requirements and criteria, including:
   a. System, subsystem, and equipment descriptions
   b. Operating standards
   c. Regulatory requirements
   d. Operating characteristics
   e. Limiting conditions
   f. Performance curves
3. Detailed review of documentation, including:
   a. Emergency manuals and procedures
   b. Operations manuals and procedures
   c. Maintenance manuals and procedures
   d. Identification systems
   e. Warranties and Guarantees
   f. Maintenance service agreements and similar continuing commitments
   g. Normal shutdown instructions
   h. Required service agreements for electric or electronic systems
   i. Special operating instructions and procedures
   j. Troubleshooting and diagnostics
   k. Test and inspection procedures

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up as required at instructional location.

END OF SECTION 01820
SECTION 02080
ASBESTOS ABATEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 COMPLIANCE AND INTENT

A. The Contractor is responsible for repair, to the satisfaction of the District, of surfaces not scheduled for demolition that become damaged as a result of the work. All unscheduled repair work shall be at no increase to contract price.

B. Contractor shall coordinate removal with all site requirements related to protection of existing finishes. Water and encapsulants used during abatement work must not migrate beyond established regulated work area barriers. All protection work must be completed prior to the start of abatement work on each floor and any pathways of travel on other floors.

C. This project deals with abatement of asbestos-containing materials (ACMs). It is necessary for the Contractor to coordinate all abatement work with the project drawings and specifications. During all work, provide monitoring and worker protective equipment in accordance with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this specification. Where there is conflict, the most stringent requirement shall apply.

D. The work covered by this specification includes the handling, removal, and proper disposal of ACMs. All hazardous materials shall be removed and disposed of according to all federal, state and local regulations. The Contractor shall determine if additional hazardous materials will be impacted by the scope of the abatement work. The cleanup of any incidental asbestos found in areas undergoing abatement of asbestos that become separated from the building during the dismantling process are part of the work.

E. The abatement workers shall have received Cal-OSHA accredited training and be certified for asbestos abatement work.

F. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for asbestos abatement in accordance with this specification.

G. Comply with all federal, state, and local regulations pertaining to asbestos removal, storage, transportation and disposal; employee health and safety; Contractor certifications; and all licenses, permits, and training.
H. Work on the premises shall be confined to areas designated in the Contract Documents. Materials and equipment shall be stored within areas designated by the District. Should additional space be required, the Contractor shall request permission for additional space and shall adequately safeguard occupants from associated health and safety hazards.

I. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to asbestos abatement, handling, and the subsequent cleaning of contaminated areas.

J. During removal activities, the Contractor shall protect against contamination of soil, water, plant life, sensitive building finishes, adjacent building areas, and shall ensure that there is no airborne release of dusts. The District may collect air samples in the building and in adjacent areas to evaluate the Contractor’s performance. Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.

K. It is the Contractor’s responsibility to determine the quantities of ACMs that will require removal prior to commencement of the project. The Contractor shall conduct a site visit to determine exact locations of materials that will require abatement. This section provides appropriate protocols for handling and disposal of ACMs. All ACMs shall be removed according to the procedures outlined in this specification. If additional suspect ACMs are discovered during the course of the abatement work, immediately notify the District and/or the District’s Environmental Consultant.

L. The work of this section shall be performed by an entity that holds a current, valid asbestos handling license issued by the California State Contractor’s Licensing Board (SCLB) and a current valid Certificate of Registration for Asbestos-Related Work issued by the California Department of Industrial Relations-Division of Occupational Safety and Health (Cal-OSHA), unless other specified. Display copies of CSLB license and Cal-OSHA Registration in a visible place at the job-site.

M. ACMs removed during the abatement activities shall be disposed of in an approved manner complying with all applicable federal, state, and local regulations. Appropriate waste manifests or letters of salvage shall be furnished to the District thereby limiting the District’s liability for improperly salvaged items. Materials are conveyed to the Contractor “as is,” without any warranty, expressed or implied, including but not limited to, any warranty to marketability or fitness for a particular purpose, or any purpose. The District or the District’s Environmental Consultant shall approve the non-ACM hazardous waste disposal site(s) prior to disposal for materials that may be disposed of in that manner.

N. All interior asbestos abatement work shall be conducted using a negative pressure enclosure and three stage decontamination units unless otherwise specified.
1.3 DEFINITIONS

A. The following definitions pertain to work of this section.

1. Abatement: Process of controlling fiber release from ACMs including encapsulation, enclosure, controlled renovation procedures, removal, clean-up and disposal.

2. ACM: Asbestos-containing material

3. Aggressive Sampling: Air sampling either during or following the agitation of the air.


5. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and uncontaminated areas. Typically consists of two curtained or gasketed doorways separated by a distance of at least six feet such that one passes through one doorway into the airlock, allowing the doorway to close off the opening. This airlock must be maintained in uncontaminated condition at all times.

6. Ambient Air Quality: The quality of air (in terms of airborne fiber content) that is present in a given space.

7. Area Sampling: Sampling of airborne asbestos fiber concentrations within the work area and outside the work area. Sampling shall represent airborne concentrations that may reach the breathing zone.

8. Asbestos Fibers: Refers to asbestos fibers having an aspect ratio of 3:1, and those fibers longer than five (5) microns.

9. Asbestos Permissible Exposure Limit (PEL): A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. This level represents the 8-hour time-weighted average of 0.1 fibers per cubic centimeter of air as measured by Phase Contrast Microscopy (PCM) analytical method.

10. Asbestos-Containing Material (ACM): Those manufactured products and construction materials including structural and mechanical building materials, as well as packings and gaskets that contain more than one percent (1.0%) asbestos by weight.

11. Asbestos: Asbestos includes asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-gunnerite (amosite), anthophyllite, tremolite, and actinolite. For the purposes of determining worker respiratory protection, both the asbestiform and non-asbestiform of the above minerals, and any chemically treated or altered materials shall be considered as asbestos.

12. Authorized Visitor: Designated employees or consultants for the District and representatives of any federal, state or local regulatory or other agency having jurisdiction over the project.

13. Baseline: Refers to the background levels of asbestos monitored before abatement.
14. Breathing Zone: A hemisphere forward of the shoulders and head with a radius of approximately six to nine inches.

15. Breach: A rift or gap in the critical or secondary barriers that allow egress of air from the containment to outside, or vice versa.

16. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in-situ asbestos matrix.


18. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample(s) from the moment it is collected, transported, analyzed, and ultimately stored in an archive.

19. Change Rooms: Refers to the two chambers in the decontamination area used to change into and out of protective clothing.

20. Certified Industrial Hygienist (CIH): A person certified by the American Board of Industrial Hygiene.

21. Clean Room: An uncontaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

22. Clearance Level: Clearance level for samples analyzed by PCM will be less than 0.01 fibers per cubic centimeter of air and for TEM will be less than 70 structures per square millimeter (<70 s/mm²). Samples may be collected by aggressive or non-aggressive sampling methods and the minimum air volume shall be 1,200 liters.

23. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.

24. Critical Barrier: A unit of temporary construction that provides the only separation between asbestos work area and an adjacent potential occupied space. This includes the decontamination unit, perimeter walls, ceilings, penetrations and any temporary critical barriers between the work area and the uncontaminated environment.

25. CSLB: Contractors State Licensing Board

26. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.

27. DOP: Dioctylphthalate, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.

28. DOT: Federal Department of Transportation.

29. DOSH: Division of Occupational Safety & Health (see also Cal-OSHA)

30. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.
31. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

32. Disposal Bag: Minimum six (6) mil thick leak-tight plastic bags used for transporting asbestos waste from a work area to disposal or shipping container. Each disposal bag must have required labels according to Title 8 CCR 1529 (Cal-OSHA asbestos rule), 5194 (HAZCOM). RACM waste must be additionally labeled according to 49 CFR 171-179 (USDOT), and 40 CFR 61 Subpart M (NESHAP). Hazardous waste disposal bags must be labeled with generator’s name, address, site location, generator number, and the following information:

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
AVOID BREATHING AIRBORNE ASBESTOS
RQ WASTE ASBESTOS, 9 NA 2212 PG III
(Class 9 placard)
HAZARDOUS WASTE
STATE AND FEDERAL LAW
PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

33. District: Contra Costa Community College District

34. District’s Environmental Consultant: Environmental Consulting firm and its representatives retained to provide compliance oversight and monitoring for the Contractor's asbestos abatement work activities.

35. Encapsulant: A liquid material that can be applied to ACMs that controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging) or by penetrating into the material and binding its components together (penetrating encapsulant).

36. Encapsulation: A specified procedure necessary to coat ACMs or asbestos contaminated surfaces with an encapsulant to control the possible release of asbestos fibers into the ambient air.

37. Enclosure: The construction of an airtight, impermeable, permanent barrier surrounding the ACM to prevent the release of asbestos fibers into the air.

38. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.

39. Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment. The equipment room shall be kept clean from asbestos-containing debris at all times.
40. Excursion Limit: A California Code of Regulations (Title 8 CCR 1529) requirement that ensures no employee exposed to airborne concentrations of asbestos in excess of 1.0 fibers per cubic centimeter of air as averaged over a sampling period of thirty (30) minutes.

41. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.

42. Fixed Object: A unit of equipment or furniture in the work area that cannot be removed from the work area.

43. Friable Asbestos-Containing Material: Material that contains more than 1.0% asbestos by weight, and that can be crumbled, pulverized or reduced to powder by hand pressure when dry.

44. Foreman: An individual who typically fulfills the duties of "competent person" as defined by Title 8 CCR 1529. This individual must supply documentation of a passing grade in a Cal-OSHA accredited course in Asbestos Contractor/Supervisor training. The foreman must be on-site during all abatement work.

45. Glove Bag: A polyethylene bag with two inward projecting long sleeve gloves, designed to enclose an object from which an ACM is to be removed. Bags shall be seamless at the bottom, have a minimum thickness of 6 mil, and shall be labeled appropriately.

46. Glove Bag Technique: A method for removing ACM from heating, ventilation and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other non-planar surfaces. The glove bag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the process. Secondary containment shall be provided for all glove bag work unless otherwise noted.

47. Gross or Full Abatement: Designated rooms, spaces, or areas of the project that have been totally sealed, contained in polyethylene, equipped with decontamination enclosure systems, and placed under negative pressure.

48. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.

49. Manifest: The document authorized by both Federal and State authorities for tracking the movement of ACMs.

50. Movable Object: A unit of equipment or furniture in the work area that can be removed from the work area (e.g., smoke detectors, lights, etc.)

51. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere, and negative during inhalation in relation to the air pressure of the outside atmosphere.

52. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).

54. NIOSH: National Institute for Occupational Safety and Health: Sets test standards, analytical methods, and certifies performance of various respirator designs (research institute within Federal OSHA).

55. NIST: National Institute of Standards and Technology: Administers the NVLAP Program.

56. NOA – Naturally Occurring Asbestos. Found in soil, fill and concrete.

57. NVLAP: National Voluntary Laboratory Accreditation Program – evaluates and certifies laboratories doing PLM and TEM analyses.

58. Passive Sampling: Refers to air sampling with no air agitation.

59. Permissible Exposure Limits (PEL): A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. This level represents the 8-hour time-weighted average of 0.1 fibers per cubic centimeter of air and 30 minute excursion limit of 1.0 fibers per cubic centimeter of air as measured by Phase Contrast Microscopy (PCM) analytical method.

60. Phase Contrast Microscopy (PCM): Technique using a light microscope equipped to provide enhanced contrast between the fibers and the background. Filters are cleared with a chemical solution and viewed through the microscope at a magnification of approximately 400X. This method does not distinguish between fiber types and only counts those fibers longer than 5 microns and wider than approximately 0.25 microns. Because of these limitations, fiber counts by PCM typically provide only an index of the total concentration of airborne asbestos in the environment monitored.

61. Polarized Light Microscopy (PLM): An optical microscope technique used to identify asbestos content and distinguish between different types of asbestos fibers by their shape and unique optical properties.

62. Powered Air Purifying Respirator (PAPR): A full facepiece respirator that has the breathing air powered to the wearer after it has been purified through a filter.

63. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

64. Remodel: Replacement or improvement of an existing building or portion thereof where exposure to airborne asbestos may result. Remodel includes, but is not limited to, installation of materials, demolition, cutting, patching, and removal of building materials.

65. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

66. Shower Room: A room between the clean room and the equipment room in the work decontamination enclosure system. This room contains hot and cold or warm running water and soap suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
67. Surfactant: A chemical wetting agent added to water to improve penetration, this reducing the quantity of water required for a given operation or area.

68. Transmission Electron Microscopy (TEM): Asbestos structure analysis for a specified volume of air. TEM is a technique that focuses an electron beam onto a thin sample. As the beams transmits through certain areas of the sample, an image resulting from varying densities of the sample is projected onto a fluorescent screen. TEM is the state-of-the-art analytical method for identifying asbestos fibers collected in air samples in non-industrial settings. TEM microscopes equipped with selected area electron diffraction (SAED) capabilities also can provide information on the crystal structure of an individual particle.

69. TSI – Thermal Systems Insulation

70. Visible Emissions: Any emission containing particulate material that is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

71. Visual Inspection: A visual inspection by District’s Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible PCB material, debris, and dust.

72. Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system equipped with water for decontamination of equipment and sealed waste containers. The washroom or shower room comprises one airlock.

73. Water Filtration: Refers to water filtration to as small a particulate size as technically feasible, but not more than 5 microns.

74. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, HEPA vacuuming, or other cleaning utensils dampened with amended water and afterward thoroughly decontaminated or disposed of as asbestos contaminated waste.

75. Work Area: The area where asbestos removal is performed and that is defined or isolated to prevent the spread of asbestos fibers, dust or debris, and entry by unauthorized personnel. Work area is a regulated area as defined by Title 8 CCR 1529.

1.4 SCOPE OF WORK

A. Provide the removal of ACMs as specified in this section. Reference all other sections of the Specifications and other documents included in the contract documents for information and requirements that affect the work of this Section.

B. Coordinate the removal or installation of fasteners or new anchorage through ACM wall and flooring systems as required by the contract documents.

C. Table 1 attached provides estimated quantities of ACMs that will require removal and/or will be disturbed by the required seismic retrofit work. A 10% variance of quantity of actual ACM and estimated ACM in Table I is not considered a changed condition. The Contractor is responsible for field verifying quantities of ACMs to be abated and/or disturbed.
D. The following materials shall be disposed of as regulated asbestos-containing material (RACM): pipe fitting insulation, vinyl sheet flooring with paper backing, flooring mastic if removed with mechanical methods and all Category I and Category II materials rendered friable during the removal process.

E. The following materials can be disposed of as Category II Non-friable ACMs if they are not rendered friable during removal: floor tile/mastic, flooring mastics (removed by manual methods). If a removal solvent is used to abate the flooring mastic, the Contractor shall perform waste characterization and dispose of the material as required.

F. Non-textured drywall with associated joint compound, texture on drywall and cove base mastic that contains less than 1.0 percent (<1.0%) asbestos by point count method may be disposed of as construction debris.

G. Any dust or debris generated from cutting, drilling, and removal or installation of attachments to existing ACMs shall be disposed as an RACM.

1.5 REFERENCES

The publications listed below form a part of this specification by reference. The publications are referred to in the text by basic designation only. If there is a conflict between any of the listed regulations or standards, then the most stringent or restrictive shall apply.

A. American National Standards Institute (ANSI) and American Society for Testing and Materials (ASTM)

2. ANSI Z87.1, 2003, Occupational and Educational Eye and Face Protection
3. ANSI Z88.2 1992, Respiratory Protection
4. ANSI Z89.1, 1986, Requirements for Protective Headgear for Industrial Workers
5. ANSI Z41, 1999, Personal Protection – Protective Footwear
6. ANSI Z88 6, 1984, Respiratory Protection – Respiratory Use Physical Qualifications for Personnel
9. ASTM D 1331, Solutions of Surface-Active Agents
10. ASTM D 2794, 1993 Resistance of Coatings to the Effects of Rapid Deformation (Impact)
15. ASTM E849, 1986 Safety and Health Requirement Relating to Occupational Exposure to Asbestos

B. California Assembly Bills (CAB)
   1. CAB 040, Yearly Registration of Contractors

C. California Code of Regulations (CCR)
   1. Title 8 CCR 5208, General Industry – Asbestos
   2. CCR CARS, Carcinogen and Asbestos Registration Sections 340-344.53, 341.6 Amended, and 341.9 Amended Through 341.14
   3. CCR ESO, Electrical Safety Orders, Chapter 4, Subchapter 5
   4. CCR 1523, Illumination
   5. CCR 1529, Asbestos in the Construction Industry
   6. CCR 1531, Construction Respiratory Protective Equipment
   7. CCR 3203, Injury and Illness Prevention Program
   8. CCR 3204, Access to Employee Exposure and Medical Records
   9. CCR 3220, Emergency Action Plan
   10. CCR 3221, Fire Prevention Plan
   11. CCR 5144, Respiratory Protection Equipment Standard
   12. CCR 5194, Hazard Communication Standard
   13. CCR 6003, Accident Prevention Signs
   14. Title 22, Division 4, Minimum Standards for Management of Hazardous and Extremely Hazardous Waste

D. California Health Services (CHS) Titles 22 and 23, California Administrative Code Disposal Requirements
   1. CHS 25123, Section 25123
   2. CHS 25124, Section 25124
   3. CHS 25143, Section 25143
   4. CHS 25163, Section 25163
   5. CHS 66508, Section 66508
   6. CHS 66510, Section 66510
   7. CHS DIV 4, Division 4, Commencing with Section 66000, "Disposal"

E. California Health and Safety Code (CHSC)
   1. CHSC 20, Division 20, Commencing with Section 24200

F. California Labor Code (CLC)
   1. CLC DIVISION 5, Part 1, commencing with 6300
G. California Propositions (CP)
   1. CP 65, Proposition 65

H. California State Board of Equalization (CSBE)
   1. CSBE ETU, Excise Tax Unit

I. California State License Board (CSLB)
   1. CSLB CBPC, California Business and Professional Code Sections 7058.5 and 7058.7, "Certification"

J. Code of Federal Regulations (CFR)
   1. 29 CFR 1910.134, Respiratory Protection
   2. 29 CFR 1910.141, Sanitation
   3. 29 CFR 1910.145, Accident Prevention Signs and Tags
   4. 29 CFR 1926.21, Safety Training and Education
   5. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
   6. 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response
   7. 29 CFR 1926.59, Hazard Communication
   8. 29 CFR 1910.1000, Air Contaminants
   9. 29 CFR 1926.1101, Asbestos
   11. 40 CFR 61-SUBPART M, National Emission Standard for Asbestos
   13. 40 CFR 745, Lead; Requirements for Lead-Based Paint Activities
   14. 40 CFR 763, Asbestos Containing Material in Schools

K. State and Local Regulations
   1. Regulation 11, Rule 2, Bay Area Air Quality Management District (BAAQMD)

L. Underwriters Laboratories, Inc. (UL)
   1. UL 586-96, 1996 Test Performance of High-Efficiency Particulate Air Filter Units

1.6 SUBMITTALS PRIOR TO START OF WORK

A. The reviews by the District or District's Environmental Consultant are intended to be only for general conformance with the requirements. The District or District's Environmental Consultant assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.

B. Before commencing work involving the abatement or disturbance of asbestos, submit the following for review by the District or District's Environmental Consultant.
1. Provide a detailed asbestos abatement work plan that follows Attachment A – Asbestos Abatement Work Plan Outline.

2. Provide an asbestos site safety plan prior to project initiation. The site safety plan shall deal with, at a minimum: site safety and health hazards; fiber release incidents; control of water leakage or discharge within and/or from the work area; medical emergency; asbestos handling procedures; fall protection; electrical safety; Contractor’s internal administrative and inspection procedures; earthquakes and/or fire emergency procedures; protocol for responding to complaints or questions from interested parties; 24-hour emergency telephone numbers for company officers with authority to respond to emergencies.

3. Competent Person (as defined by Title 8 CCR 1529): Demonstrate education and specialized training with successful completion of examination of a Cal-OSHA accredited asbestos training course.

4. Workers: Demonstrate education and specialized training with successful completion of a Cal-OSHA accredited asbestos training course. All site workers shall submit proof of current Class IV training. All workers that will likely disturb existing ACMs during the seismic retrofit work including but not limited to removal or installation of components attached to ACMs shall submit evidence of current Class III asbestos training.

5. Submit current certificates (less than 11 months) signed by each employee and trainer that the employee has received proper training in the handling of materials that contain asbestos. Include documentation showing that the worker understands the following: health implications and risks involved (including the illnesses possible from exposure to airborne asbestos fibers), the use and limits of the respiratory equipment to be used, and the results of monitoring of airborne quantities of asbestos concerning health and respiratory equipment.

6. Proof of Respirator Fit Testing: Provide proof of respirator fit testing. Fit testing records must be less than eleven (11) months old and document testing on the type of respiratory protective equipment used for this project. Fit testing records must be signed by the Competent Person.

7. Foreman Training: Submit evidence that the foreman to be used on the job fulfills the qualifications detailed in this specification and has experience in similar jobs.

8. Medical Examinations: Submit evidence signed by a physician that each employee used on the job has received an appropriate medical examination as detailed in Title 8 CCR 1529. The submitted document must be less than eleven (11) months old.

9. Written Notification to Fire and Police Departments: Provide documentation showing notification to local fire and police departments of the abatement three (3) days before commencement.

10. Rental Equipment: When rental equipment is to be used in the abatement areas or to transport hazardous waste, the Contractor shall provide written notification regarding intended use of the rental equipment to the rental agency before use, with copies to the District’s Environmental Consultant.
11. Certificates of Compliance: Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2. Submit results of onsite DOP testing of all HEPA-filtered ventilation equipment.

12. Submit uniform hazardous waste manifests prepared, signed and dated by an agent of the landfill. The manifest must certify the amount of hazardous materials delivered to the landfill. The manifest must be provided to the District or District's Environmental Consultant within ten working days after delivery.

13. Satisfactory proof that written notification and subsequent updates have been provided to the Bay Area Air Quality Management District (BAAQMD), in accordance with Regulation 11, Rule 2, Cal-OSHA, and Title 40 CFR Part 61 Subparts A&M, National Emission Standards for hazardous Air Pollutant, U.S. EPA.

14. Licenses: Submit copies of state and local licenses, evidence of Cal-OSHA registration and permits necessary to carry out the work of this contract.

15. Notification of Other Contractors: If other contractors are working at the job site, before beginning any work the Contractor must inform all other contractors in writing regarding the location, nature, and requirements of the work areas.

16. Material Safety Data Sheets/Specification Sheets: The Contractor shall submit Material Safety Data and Specification Sheets for all chemicals, encapsulants, etc. to be used for this project.

1.7 SUBMITTALS AT THE COMPLETION OF THE PROJECT

A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the District prior to acceptance of final pay request and shall include the following:

1. Copies of the Security and Safety Logs showing names of persons entering the workspace. The logs shall include date and time of entry and exit, supervisor's record of any accident (detailed description of accident).

2. Chain of custody documentation and laboratory reports for all analyses performed.

3. Emergency evacuations and any other safety or health incident.

4. Submit uniform hazardous and non-hazardous waste manifests prepared, signed and dated by an agent of the landfill. The manifest must certify the amount of hazardous materials delivered to the landfill. The manifest must be provided to the District or District's Environmental Consultant within ten working days after delivery.

5. Personal air sample results.

6. Pressure differential data readings for each differential recording device on the site.

7. Project Summary:
   a. Abatement contractor's name and address, certification number (CSLB), registration number (DOSH) and Tax ID number.
b. Hazardous waste hauler certifications (DHS, DOT).
c. Name, address and registration number of hazardous waste hauler.
d. Laboratory performing analyses (NV LAP).
e. Contract number and name of project.
f. Specific inventory (including locations and approximate quantities) of the hazardous materials which were removed or handled.
g. Number of employees working on the project.
h. Dates of commencement and completion of on-site work.
i. Work method employed (i.e., glove bag, mini-containment, full containment with negative air and decontamination enclosure system, etc.)
j. Name, location, telephone number and EPA registration of waste disposal site(s) used.
k. DOP testing results.

1.8 CONTRACTOR MONITORING

A. The District or District’s Environmental Consultant reserves the right to perform air sampling in selected areas during the course of the project. District or District’s Environmental Consultant reserves the right to stop work within in an area if in the course of performing monitoring, the District or District’s Environmental Consultant observes instances of substantial non-conformance with the this Section or other Sections of the Specification presenting health hazards to workers, the general public or the surrounding areas. Work shall not resume until the corrective measures have been enforced. Instances of substantial non-conformance shall include, but not be limited to, the following:

1. Activities or misconduct imperiling worker’s safety and health.
2. Airborne fiber concentrations as measured by PCM outside of the containment area exceeding background or 0.01fcc whichever is greater. Airborne concentrations as measured by TEM outside of the containment area exceeding background or 70 S/mm², whichever is greater.
3. Loss of negative pressurization for more than two minutes.
4. Breaches in containment resulting in potential release of asbestos to non-work areas.

B. The District’s Environmental Consultant may perform air sampling inside and outside the hazardous materials work area during all phases of the work. The Contractor shall cooperate fully with the District’s Environmental Consultant and ensure the cooperation of his workers during collection of air samples and work area inspections.

C. When visual inspections or air monitoring are specified, the Contractor shall notify the District or District’s Environmental Consultant in writing 24 hours in advance of the day and time when the Contractor will be ready for such inspections or monitoring. Such requests shall be initiated by the Contractor’s Competent Person or
Foreman indicating that the work area has been previously inspected and is ready for inspection/testing.

D. Air monitoring generated by the District or District's Environmental Consultant shall not be used by the Contractor to represent compliance with regulatory agency requirements for monitoring of workers exposure to airborne asbestos, nor shall any other activity on the part of the District or District's Environmental Consultant be construed to meet the Contractor's compliance with applicable health and safety regulations.

PART 2 - PRODUCTS

2.1 SIGNS AND LABELS:

A. Provide labeling in accordance with State and Federal EPA requirements. Provide the required signs, labels, warnings, placards or posted instructions for containers used to transport hazardous material to the landfill.

B. Location of Caution Signs and Labels: Provide bilingual caution signs at all approaches to work areas in languages used by the Contractor's employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos-containing materials, scrap, waste, debris, and other products contaminated with hazardous materials.

C. Warning Sign Format: Vertical format conforming to Title 8 CCR 1529:

   DANGER
   ASBESTOS
   CANCER AND LUNG DISEASE HAZARD
   AUTHORIZED PERSONNEL ONLY
   RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

D. Warning Label Format: Provide labels that comply with Title 8 CCR 1529 of sufficient size to be clearly legible, displaying the following legend:

2.2 ENCAPSULANTS

A. Encapsulants shall be U.L. Listed, in full-scale E-119 fire test.

B. Average depth of penetration shall meet manufacturer's recommendations.

C. Dry mil thickness of bridging encapsulating systems (if used) shall be as indicated in the specific treatment instructions included in this specification, and as recommended by the manufacturer.

D. Performance Requirements: Classification - penetrating encapsulant; spray applied and brushable. Product shall be tested and listed by EPA and possess the following characteristics:
2. Fire classification - UL Class A approved in the specific or similar assembly to its intended application.
3. Product shall be tested and rated non-toxic and non-irritating under the Federal Hazardous Substances Control Act and contain no methylene chloride.
4. Material shall be tinted sufficiently to provide a readable contrast to background color to which it is applied.

2.3 PLASTIC SHEETING:

A. Use fire-retardant (FR) polyethylene (poly) film.
   1. Thickness - 6-mil, minimum, NO EXCEPTIONS.
   2. Flame Resistance/Flame Spread Rate <25.
   3. Conforms to NFPA #701 and Tested in accordance with ASTM E-84.

2.4 TAPE, ADHESIVE, SEALANTS:

A. Tape, 2" or wider, shall be capable of sealing joints of adjacent sheet of polyethylene and shall attach polyethylene sheet to finished or unfinished surfaces or similar materials. Tape shall be capable of adhering under dry and wet conditions, including use of amended water. Taping to critical or sensitive surfaces shall be completed using preservation sealing tape.

B. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

C. Fire resistant sealants shall be compatible with concrete, metals, wood, etc. Sealant shall prevent fire, smoke, water and toxic fumes from penetrating. Sealant shall have a flame spread, smoke and fuel contribution of zero, and shall be ASTM and UL rated for 3 hours for standard method of fire test for fire stop systems.

2.5 STRIP CHART RECORDER(S):

A. Where interior work areas are required, each shall have a minimum differential pressure of 0.025 inches water gauge at all times. Fluctuations below 0.025 inches of water column are unacceptable and may require temporary cessation of work until conditions are corrected.

B. Multiple data recorder(s) shall be used to document the level of pressure difference between the containment space and all other spaces as deemed necessary by the District or District's Environmental Consultant. Defective or non-operating instrumentation may require temporary cessation of work until instrumentation is repaired or replaced.

C. The data recorder will be checked a minimum of four times per day by a person familiar with the operation. Each check shall be documented with a time and date notation and the initials of the person performing the check. A copy of the data shall be submitted daily to the District or District's Environmental Consultant.
D. Differential air pressure systems shall be in accordance with Appendix J of EPA's "Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA 560/5-85-024. The Differential pressure system shall be continuously monitored by the Contractor using a recording instrument connected to an appropriate strip chart recorder. The recording instrument shall be connected to an audible alarm that will activate at a pressure differential of -0.025 inches water gauge air pressure.

2.6 VACUUM EQUIPMENT:

A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing. Repeat DOP testing every thirty (30) days after initial testing. Provide documentation to the District or District’s Environmental Consultant with 24 hours of DOP testing.

2.7 LOCAL EXHAUST SYSTEM:

A. Where containments are required, sufficient High Efficiency Particulate Absolute (HEPA) ventilation units shall be used to maintain the negative pressure in each interior work area at 0.025 inches of water column and a minimum of four (4) air changes per hour.

B. The ventilation system shall remain in operation 24 hours a day until the work area has passed the specified clearance criteria. HEPA filtered air which is exhausted to maintain negative pressure shall be exhausted from the building at locations approved by the District or District’s Environmental Consultant. Exhausted air shall not be near or adjacent to other building intake vents or louvers or at entrances to buildings. Other HEPA units shall operate within the enclosure to circulate air and control fiber counts.

C. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the air filtration units. The test results shall be signed by the individual performing the testing. Repeat testing if the unit or the air filtration units have been repaired or replaced. Repeat DOP testing after thirty (30) days after initial testing. Provide documentation to the District or District’s Environmental Consultant with 24 hours of DOP testing.

2.8 RESERVE EQUIPMENT:

A. Contractor shall have the following equipment on site: two reserve, functioning and DOP-tested HEPA Filter Vacuum Cleaning Units, two reserve and DOP-tested HEPA area filtration units for every four containments. Contractor shall also have sufficient polyethylene (poly), respirators, protective equipment, tape, tools, decontamination enclosure systems for each work area.

B. Provide authorized visitors requiring access to the work area with suitable protective clothing, headgear, eye protection, as described in this specification, whenever the visitor must enter the work area. The Contractor shall have available and maintain at all times a minimum of three (3) suits and other suitable protective equipment for this purpose. All protective equipment shall be new and for the exclusive use of visitors.
C. The Contractor shall document that each visitor has been trained and fit-tested prior to entering an abatement area.

2.9 SCAFFOLDING:

A. Scaffolding, as required to do the specified work, shall meet all applicable safety regulations and DOSH standards. A non-skid surface shall be furnished on all scaffold surfaces subject to foot traffic. Contractor must comply with District’s and General Contractor’s Fall Protection Requirements. Scaffolding shall be adequately protected to prevent contamination of planking and framing.

2.10 TRANSPORTATION EQUIPMENT:

A. Transportation equipment, as required, shall be lockable and suitable for loading, temporary storage, transit and unloading of contaminated waste without exposure to persons or property. Any vehicle used to transport asbestos waste shall be properly registered with all applicable controlling agencies.

2.11 CONNECTIONS TO WATER SUPPLY:

A. Contractor shall assure that all connections to the site’s water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water shall not damage existing finishes or equipment.

B. Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system in each work area. Provide fittings as required to allow for connection to existing wall hydrants or spouts.

2.12 WATER HEATER:

A. The hot water supply must be adequate to allow for 15 minutes of continuous usage while maintaining a water temperature of 85 °F. At minimum provide UL rated 40-gallon electric water heater to supply hot water for the decontamination unit shower. Provide relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 24 inch X 24 inch X 6 inch deep pan, made of 19 gauge galvanized steel with handles. Drip pan shall be securely fastened to the water heater with bailing wire or similar material. Wiring of the water heater shall comply with NEMA, NEC and UL standards.

2.13 OTHER TOOLS AND EQUIPMENT:

A. The Contractor shall provide other suitable tools for the stripping, removal and disposal activities.

B. Prohibited Equipment: The following equipment is prohibited from use on this project unless accepted in writing by the District or District’s Environmental Consultant:

1. High or low pressure water blasting equipment for hosing of work areas.
2. Bead blasting or other uncontained abrasive blasting methods.
3. Vacuum-powered removal or collection equipment located outside the asbestos work area, such as a "Vacu-Loader".
4. Gasoline, propane, diesel or other fuel powered equipment inside the building, unless previously approved in writing by the District or District’s Environmental Consultant.
5. Equipment that creates excessive noise or vibration that would affect the safety of the building or generate complaints from neighboring building occupants. No equipment shall exceed an A-weighted sound level of 85 dB as measured at 3 ft. from the radiating source without written permission of the District or District’s Environmental Consultant.
7. Flammable solvents with a flash point below 140 degrees F or materials containing ethylene glycol ether, methylene chloride, ethyl chloroform (1,1,1-trichloroethane), or other hazardous substances.
8. Non-fire retardant polyethylene sheeting.
9. Polyurethane spray foam for application in fire-rated assemblies, including but not limited to penetrations into stairwells, mechanical rooms, electrical closets, rated floor-to-floor assemblies, etc.

PART 3 - EXECUTION

3.1 INITIAL AREA ISOLATION

A. The District or District’s Environmental Consultant reserves the right to inspect and approve all containment setups before any abatement is undertaken.

B. If a containment area is breached (failure of polyethylene seals, visible dust emission, fiber counts above background level, etc.), the Contractor shall take immediate action to control the breach and clean the area to the satisfaction of the District or District’s Environmental Consultant.

C. If sample results indicate that conditions have exceeded the baseline or clearance criteria, as determined by the District or District’s Environmental Consultant, all work shall cease. Work shall not recommence until the condition(s) causing the increase have been corrected.

D. Verify that all electrical power, gas, sewage, water, phone lines, fire life safety lines and sprinkler systems to the work area have been shut down and disconnected so that there is no possibility of reactivation and electrical shock.

E. Provide all connections for temporary utilities in the work area needed throughout abatement. Temporary electrical power shall be according to OSHA and the National Electrical Code for Wet Environments.

F. Contractor shall conform to the District’s lockout requirements, and secure the work area at all times. Area entrances and exits shall be secured by the Contractor throughout the abatement phase. Unauthorized visitors are strictly prohibited. Only
the Contractor, District or District’s designative representatives are permitted at the job site. Contractor shall ensure that all doors, gates, windows, and potential entrances to the work areas and the designated waste location areas are secured and locked at the end of each workday.

G. Contractor shall store all materials, equipment, and supplies for the project inside the building or in areas designated by the District and in accordance with District’s requirements.

H. Provide signs around the perimeter of all the interior works areas according to EPA and Cal-OSHA.

I. Contractor shall provide temporary sanitary services of adequate capacity to handle the maximum estimated crew size plus an additional twenty percent. Contractor shall maintain the temporary facilities throughout the duration of the project.

J. The Contractor shall be responsible for identifying all HVAC components (if applicable) that lead into or out of the work areas. All components shall be disconnected and sealed airtight for the duration of the abatement work. All openings shall be sealed with two (2) layers of 6 mil polyethylene secured with duct tape, as applicable.

K. Pre-clean the work area and fixed objects in the work area using HEPA filtered vacuums and/or wet cleaning methods. Protect fixed objects with protective barriers (as appropriate) and cover with 6 mil poly sealed with tape.

3.2 CONTAINMENT SET-UP PROCEDURES

A. Contractor shall construct a full negative pressure containment with 3 stage decontamination chamber for the removal of asbestos-containing interior materials including but not limited to thermal system insulation and vinyl sheet flooring. Install critical barriers consisting of one layer of 6-mil poly on windows and doors. Cover floor and wall surfaces with 6-mil poly sealed with tape (as appropriate). The work area(s) shall be placed under negative pressure as outlined in this specification throughout the abatement work period.

B. Contractor shall construct critical barrier negative pressure containment(s) for the removal of asbestos-containing drywall with joint compound and/or texture, vinyl floor tile and associated mastics, cove base mastic. The work area(s) shall be placed under negative pressure as outlined in this specification throughout the abatement work period.

C. Any disturbance of ACMs that produces debris must be performed within a regulated area. If dust or debris is generated from the asbestos related activity, work must be performed in a mini-enclosure with negative pressure, a critical barrier containment, or with a local exhaust method.

D. To permit the inspector to view the majority of the work area, the Contractor shall provide easily accessible viewing ports from the clean space into each abatement area. Viewing ports must be a minimum of 2’ x 2’, clear-see-through plastic with no scratches, tape or glue marks.
E. Pressure differential data recorders are required to monitor the pressure differential in the work area. The recorders must be calibrated prior to arriving on site and shall be recalibrated monthly throughout the project. Recalibration shall be performed by qualified technicians following the procedures outlined by the manufacturers. Provide documentation of calibration before beginning work and monthly thereafter.

F. A three-chambered decontamination unit shall be required during the abatement work conducted in full containment. The unit shall be located immediately outside the contained area. A pre-fabricated unit is acceptable. Chambers shall be arranged as follows: (1) a clean/change room shall be the first chamber entered from outside the work area, (2) a shower shall be located between the clean/change room and the dirty/change room, and (3) a dirty/change room shall be the last chamber before entering the work area.

1. The clean/change room of the worker decontamination unit shall be of sufficient size to accommodate the work crew and their belongings. It shall include a respirator storage area and be fully equipped with reserve equipment and materials such as clean suits, towels, soap, tape, and respirator filters.

2. Worker decontamination unit walls shall be a minimum of two layers of 6-mil fire retardant poly and floors shall be constructed with a minimum of three layers of fire retardant poly. All entry and exit doorways shall consist of at least two sheets of overlapping, fire resistant poly. At no time shall the flapped doors be taped open in order to expedite material or personnel load-out.

G. All water from the shower and bag wash area shall be filtered to the technically feasible limit but not more than five (5) microns before disposal. In addition, the Contractor shall comply with all current local, state and federal codes relating to waste water release. All water connections must be verified leak for leaks and turned-off at the conclusion of each shift. All shower water shall be drained from the shower pan at the end of each shift.

H. A two-chamber decontamination unit may be allowed, unless noted elsewhere, during the abatement work conducted in critical barrier containments. The unit shall be located immediately outside the contained area and shall contain a wash down area. A pre-fabricated unit is acceptable.

I. Contractor shall construct an equipment decontamination enclosure system consisting of a washroom, holding area and clean room separated by airlocks.

J. Approved fire extinguishers (Class ABC, multi-purpose, dry chemical type, rated: 4A; 60BC) shall be readily available to workers (maximum travel distance of 50 feet) inside and adjacent to work area(s). Personnel and emergency exits shall be clearly indicated on the inside of the containment area. The emergency exit plan shall be approved by the District's Environmental Consultant prior to the set up of any work areas.
3.3 PERSONNEL PROTECTION

A. Informed Workers:

1. All workers shall be informed of the hazards of ACMs and any other hazardous materials exposure. Workers shall also be instructed in the use and fitting of respirators, protective clothing, decontamination procedures, and all other aspects associated with the abatement work.

B. Personal Hygiene Practices:

1. The Contractor shall enforce and follow good personal hygiene practices during the abatement of ACMs. These practices will include but not be limited to the following: no eating, drinking, smoking or applying cosmetics in the work area. The Contractor shall provide a clean space, separated from the work area, for these activities.

2. Workers shall remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the work area. Upon exiting the work area, remove gross contamination from clothing before leaving the work area; proceed to the change room and remove clothing except respirators; proceed to the shower; clean the outside of the respirator with soap and water while showering; remove respirator and thoroughly wash. Following showering, proceed directly to the clean room and dress in street clothes. Do not wear disposable clothing outside the decontamination enclosure system.

3. If data gathered by the District or District's Environmental Consultant in areas adjacent to the work areas shows exposure to airborne asbestos or other hazardous materials exceeding Cal-OSHA criteria, that area will become regulated and workers must wear protective clothing and approved respirators and must have a shower facility provided to them.

C. Respirators:

1. Establish a respiratory protection program as outlined by ANSI and required by Cal-OSHA. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH). Respirators selected must be approved by the Competent Person. Submit program for review a minimum of five (5) working days prior to the commencement of abatement activities.

2. Provide workers with approved and personally-issued respirators with replaceable filters. Provide sufficient quantity of filters approved by NIOSH for use in asbestos environments so that workers can change filters as required by the manufacturer.

3. At a minimum, provide each employee with the following respiratory protection for each work phase:
   a. Pre-cleaning, containment set-up, and containment removal work: NIOSH-approved, half-face respirators with HEPA cartridges.
   b. Asbestos abatement of thermal systems insulation and: full-face powered-air purifying respirators (PAPRs) with HEPA cartridges and organic vapor cartridges (as necessary).
   c. Asbestos abatement of drywall with asbestos containing joint compound, vinyl floor tile and floor tile mastics, sheet vinyl, cove mastic, asbestos
core fire doors, asbestos cement (transite), and Class III work: half-face respirators with HEPA cartridges and organic vapor cartridges (as necessary).

4. At all times, respiratory protection selected shall, at a minimum, meet the requirements of the Table 1 below.

<table>
<thead>
<tr>
<th>Airborne Concentration of Asbestos</th>
<th>Required Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not in excess of 1.0 f/cc (10 X PEL)</td>
<td>Half-mask air purifying respirator other than a disposable respirator, equipped with high efficiency filters</td>
</tr>
<tr>
<td>Not in excess of 5.0 f/cc (50 X PEL)</td>
<td>Full facepiece air purifying respirator equipped with high efficiency filters</td>
</tr>
<tr>
<td>Not in excess of 10 f/cc (1,000 X PEL)</td>
<td>Any powered air purifying respirator equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode</td>
</tr>
<tr>
<td>Not in excess of 100 f/cc (10,000 X PEL)</td>
<td>Full facepiece supplied air respirator operated in pressure demand mode</td>
</tr>
<tr>
<td>Greater than 100 f/cc or unknown concentration</td>
<td>Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus</td>
</tr>
</tbody>
</table>

5. Provide Type C continuous flow or pressure-demand, supplied-air respirators if the average airborne concentration of asbestos exceeds 100 times the permissible exposure limit; i.e., 8-hour time-weighted average (TWA) and ceiling limit. Use the respirators presented in Title 8 CCR 1529 that afford adequate protection at such upper concentrations of airborne asbestos. When Type C Respirators are required provide the following:

a. The air supply system shall provide Grade D breathing air that conforms to OSHA and ANSI Commodity Specification for Air.

b. Compressed Air System for Type C Respirators shall be high pressure, with a compressor capable of satisfying the respirator manufacturer's recommendations. The compressed air system shall have compressor failure alarm, high temperature alarm, and a carbon monoxide alarm. It shall also have suitable in-line air purifying absorbent beds and filters to assure Grade D breathing air.

c. Use of Belt: Type C respirators shall be worn with belt to minimize possibility of dislodging face mask when hose is snagged in the work area.

D. Protective Clothing:

1. Provide personnel exposed to asbestos fibers with fire retardant disposable protective whole body clothing, head coverings, gloves, and foot coverings. Provide appropriate gloves to protect workers hands from exposure to hazardous materials. Make sleeves secure at the wrists and make foot coverings secure at the ankles with tape. Ensure that all personnel entering
and leaving the work area follow this procedure. Suits shall be of adequate size to accommodate the largest employee. Foot covers may be part of the coveralls. Non-disposable footwear shall be left in the work area until it is decontaminated or disposed of at the completion of the job.

2. Protective clothing will be worn inside the work area after the area passes pre-abatement inspection and shall remain in use until the area passes final clearance inspection.

E. Eye Protection: Provide safety glasses or goggles to personnel removing or handling asbestos-containing materials and waste.

F. Shower Requirements: Contractor shall assure that all certified employees and visitors use protective equipment and the shower or wash down facility following each entry into the containment area after the start of the asbestos abatement.

G. Emergency Precautions and Procedures:
   1. Establish emergency and fire exits from the work area. Display necessary signage at exits and paths to exits with representative visual aids. A diagram of all emergency and fire exits shall be posted in a conspicuous area proximate to the entrance to each work area.
   2. The Contractor’s supervisor/competent person shall be trained and certified in first aid and CPR, and be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall implement fiber reduction techniques until the injured person has been removed from the work area.
   3. In the event of a loss of negative pressure to the work area, work shall stop immediately and entrances to the work area sealed tight. The Contractor shall also institute fiber reduction controls until negative pressure is re-established to acceptable levels.

3.4 ASBESTOS REMOVAL (GROSS REMOVAL TECHNIQUE)

A. The Contractor shall abate all ACMs identified in this specification and/or that require disturbance to complete work specified in other specification sections.

B. The Contractor shall continuously apply wetting agent throughout the removal process. The wetting agent shall be applied with a low-pressure fine spray to minimize fiber releases. The materials shall be thoroughly saturated so that there is no detectable fiber release. All ACM shall be immediately packaged in leak-tight containers following removal.

C. Minimize removal activities of ACMs that generate airborne particulate. To the extent feasible, score or cut-out ACMs in sections, wetting along the scoring line continually, and misting the air with an airless sprayer to knock down suspended particulate. After completion of removal work, surfaces from which asbestos has been removed shall be wet cleaned to remove all visible material and residue.
D. Coordinate extent of removal with the other contract documents. Stabilize remaining ACM such as drywall, floor tile, and/or sheet vinyl to prevent disturbance during installation of replacement finishes. Apply bridging encapsulant at edges of drywall cuts.

E. Wet clean the exterior surfaces of waste containers in the equipment decontamination enclosure system prior to removal from the work area. Ensure that workers do enter from uncontaminated areas into contaminated areas in the equipment decontamination enclosure system. The Contractor shall transport asbestos-containing waste bags to the waste debris box at designated hours approved by the District or District’s Environmental Consultant. RACM shall be packaged in a minimum of two (2) 6-mil polyethylene bags. Bags shall be properly labeled for RACM disposal including site-specific generator labels. Non-friable waste shall be packaged in clear, leaktight containers and properly labeled while stored on-site. All drywall debris with ACM joint compound shall be stored in clear, leaktight containers and properly labeled while stored on-site. All other products with asbestos content (<1%) shall be packaged in leaktight containers while stored onsite. No specific labeling is required.

F. Asbestos-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. The Contractor shall clean the work area using wet methods and HEPA vacuum equipment.

3.5 ASBESTOS REMOVAL (GLOVEBAG TECHNIQUE)

A. Bags commercially manufactured specifically for glovebag enclosure removal of asbestos shall be used. All bags shall be a minimum of 6 mil clear poly, appropriately sized for removal area and task.

B. Maximum temperature of components allowable for glovebag work shall be as specified by glovebag manufacturer. Glovebag procedures shall not be permitted on live steam equipment or any equipment in excess of 150 degrees Fahrenheit.

C. Pre-clean the work area and protect immediate work area by covering floor and nearby equipment with 6 mil poly. Temporarily wrap damage/deteriorated asbestos insulation adjacent to the work with 6 mil poly to prevent further damage or disturbance during removal.

D. Provide two (2) workers for each glovebag operation.

E. Install glovebag around pipe, seal with staples and tape leaving enough sealed space above the pipe to allow access. Secure bag to pipe to support weight of stripped insulation and water (additional support may provided by a chair or ladder).

F. Insert HEPA vacuum nozzle and flexible tubing or wetting agent sprayer into hole location provided and seal airtight with duct tape.

G. Smoke test the glovebag and repair leaks as required.

H. During removal, periodically use HEPA vacuum to compensate for any leaks and wet the inside surfaces of the bag to control fiber release.
I. Cut the insulation sharply for neat sealing of exposed insulation. Leave 4 inches margin at the bag/seal point.

J. After removal and detail cleaning, wash down all surfaces to below the levels where the bag will be sealed, and saturate the waste.

K. Upon completion of the removal work but prior to commencing with encapsulation, the District or District’s Environmental Consultant reserves the right to conduct visual inspections.

L. Seal all substrate surfaces from which asbestos material was removed with an approved encapsulant and lagging cloth as appropriate.

M. Gather tools in a glove hand and pull the glove inside out. Seal the arm with a minimum of six (6) inches of tape and cut through the middle of the tape. Bend and re-tape the ends. Save the “bagged” tools for the next glovebag operation or clean by placing in a pail of water.

N. Collapse the bag with the HEPA vacuum. With the vacuum still applied, seal the bag just above the glove level. Remove the nozzle and tubing. Place a 6 mil waste bag over the glovebag and carefully remove the glove bag from the component and immediately seal it in a labeled waste bag. Check the component for loose waste and vacuum as required.

O. Seal exposed insulation with fiberglass wettable cloth or other approved material while the insulation is damp, unless other removal is planned.

3.6 DISTURBANCE OF ACMS

A. Removal and installation of fasteners and anchorage in asbestos wall and flooring systems is expected. Coordinate asbestos related work activity with contract requirements.

B. All activity that creates debris associated with the ACM material is considered disturbance such as removal of screws or attached equipment or finishes; installation of fasteners or equipment through ACMs.

C. All disturbances must be performed with wet methods and HEPA-filtered equipment such as vacuums.

D. Local-exhaust ventilation equipment used for drilling must fully enclose the bit or be performed in a negative-pressure enclosure or mini-containment.

3.7 REGULATED AREA MONITORING

E. Prior to each work shift and continuously throughout the project, each containment and decontamination enclosure system shall be inspected and repaired as needed.

F. Ambient asbestos fiber levels outside each work area shall not exceed 0.01 f/cc (PCM) or 70 s/mm² (TEM) or background whichever is greater. If the asbestos fiber concentrations outside work areas exceed those levels shown above, then
abatement must stop and operations be reviewed and modified until the fiber count can be reduced to within the acceptable limits.

3.8 AIR MONITORING

A. The purpose of any air monitoring that may be conducted by the District or District's Environmental Consultant will be to detect possible release of fibers or dusts (asbestos or lead) emanating from the work areas.

B. All PCM air sample analysis shall comply with NIOSH Method 7400. All TEM analysis shall be consistent with modified-AHERA protocols or NIOSH 7402.

C. The District or District's Environmental Consultant reserves the right to perform and / or observe final clearance inspection and sampling.

D. The method of analysis for pre-abatement and clearance air samples shall be via Phase Contrast Microscopy (PCM). The method of analysis for in-progress asbestos air samples shall be PCM and TEM at the option of the District or District's Environmental Consultant.

E. The Contractor shall be responsible for all personal air sampling. These samples shall be taken each shift and for each distinct crew operation, and shall be used to verify adequacy of fiber control and respiratory protection. Personal breathing zone air sampling shall be in accordance with the Cal-Osha asbestos standard. A minimum of 25% of the workforce shall be monitored during each shift. All sample results shall be available on-site within 24-hours of sample collection. If two consecutive shifts of non-compliant or overloaded samples are noted, the contractor shall hire a CAC/CSST at their own expense to assist in compliance with the specifications.

3.9 CLEARANCE INSPECTIONS

A. The District or District's Environmental Consultant reserves the right to conduct visual inspections. Contractor shall notify the District or District's Environmental Consultant when the decontamination process in each containment area is complete. Evidence of debris will require additional clean up by the Contractor. Contractor shall be responsible for re-cleaning all areas found to be deficient.

B. If the District or District’s Environmental Consultant determines that the work area is sufficiently clean, the Contractor may proceed. If the District or District’s Environmental Consultant determines that certain areas require additional cleaning, the Contractor shall re-clean the work area and request a second inspection of the re-cleaned area. All costs incurred by the District or District’s Environmental Consultant for inspections required after the second inspection will be charged to the Contractor.

C. Once the initial visual is passed, the Contractor shall remove all but the containment critical barriers.
D. Following the visual inspection, the Contractor shall provide a coating of non-diluted encapsulant in the work area. The Contractor shall allow the encapsulant to dry for the period specified by the manufacturer.

E. Asbestos Clearance Testing: Following encapsulation and drying time, the Contractor shall conduct air clearance sampling. Clearance air sampling shall not take place until all encapsulant is dry. The District or District’s Environmental Consultant reserves the right to approve the initiation of clearance sampling.

3.10 ASBESTOS CLEARANCE CRITERIA:

A. The clearance level per containment shall be less than 0.01 fibers per cubic centimeter via phase contrast microscopy (PCM) or less than 70 structures per square millimeter via transmission electron microscopy (TEM). Aggressive air sampling shall be used for clearance purposes. Multiple samples shall be collected in large containment areas.

B. If air samples do not pass the required clearance criteria, the area shall be re-cleaned and new samples shall be collected by the District or District’s Environmental Consultant. The Contractor shall be responsible for all costs associated with re-sampling and re-analyses. This amount will be deducted by the District from the Contractor’s final payment.

C. The District or District’s Environmental Consultant shall notify the Contractor in writing of acceptable asbestos fiber concentrations. The Contractor shall then remove all the remaining barriers in the work area.

3.11 ASBESTOS DISPOSAL

A. It is the responsibility of the Contractor to determine current waste handling, labeling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these Specifications, local, state, and federal regulations and provide documentation of the same.

B. Ensure that polyethylene bags are sealed air-tight. All bags shall be wet cleaned prior to removing them from the equipment decontamination enclosure system.

C. Ensure all disposal containers are properly labeled according to 8 CCR 1529, 5194 (HAZCOM), 49 CFR 171-179 (USDOT), 40 CFR 61 Subpart M (INESHAP), and any local regulations and state regulations as required by this specification.

D. Filter all wastewater to the technically feasible limit, but not more than five (5) microns before disposal. Comply with all current local, state and federal codes relating to waste water release.

E. Asbestos-containing waste that is properly labeled and double-bagged may be temporarily stored in areas approved by the District. Areas must be made secure before storing the waste. Waste is not to remain in temporary storage area for longer than four (4) days before final load-out of materials.

F. All friable asbestos waste shall be double-wrapped prior to transport from the site.
G. All vehicles used to transport hazardous waste must be registered with the Department of Toxic Substances Control and Department of Transportation and maintain proper registration and with vehicle at all times.

H. Trucks must have an enclosed cargo area with a storage compartment that is fully lined with a minimum of one (1) layer of 6-mil polyethylene on the walls and two (2) layers on the floor. The driver of the vehicle must stop the vehicle in a safe location at least once during each two hours or one hundred miles of travel whichever is less and inspect the contents of the shipment. At the time of inspection if any form of binding is found to be loose the driver shall immediately take action to remedy the situation for safe transportation.

I. All vehicles and containers used to transport waste are subject to inspection and approval of District prior to departure from site.

J. Contractor shall not throw bags into the truck in a way that may cause the bags to burst open.

K. Contractor shall provide at minimum one (1) day advance notification to the District when signatures are required on manifest(s). The Contractor shall ensure that the Hazardous Waste Manifest is correctly filled out. The Contractor shall give the appropriate copies to the District and shall also instruct the District in writing that they must send the appropriate copy to the Department of Toxic Substances Control.

L. If a debris box is used, the Contractor shall make all necessary arrangement with the District including obtaining all appropriate permits.

M. Contractor is responsible for all coordination with the waste disposal site and with the waste hauling company.

N. Debris box for hazardous waste shall be fully lined with a double layer of polyethylene sheeting and must be locked at all times when unattended.

O. Debris box shall be constructed with minimum 20-gauge steel with no windows or openings other than the door. The door of the container shall have a secure cover on the locking device with access to the lock only at the key-hole. Once the debris box is filled and the manifest is signed, Contractor must transport the debris box off the job site.

P. Disposal shall be in a District approved landfill that meets EPA requirements.
## TABLE I
### ESTIMATED QUANTITIES
#### ASBESTOS-CONTAINING MATERIALS

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Material Location</th>
<th>Waste Category</th>
<th>Asbestos Type</th>
<th>Estimated Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences Building</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drywall with Joint Compound</td>
<td>Throughout Building – See HM2.01 for locations of removal</td>
<td>N/A</td>
<td>Drywall: ND Composite: 0.25% CH - 400 Point Count Analysis</td>
<td>1,000 sf</td>
</tr>
<tr>
<td>Thermal System Insulation, Hard Packed Elbows on 6&quot; Outside Diameter Pipe</td>
<td>Wash Room</td>
<td>RACM</td>
<td>10% CH 5% AM</td>
<td>No removal expected¹</td>
</tr>
<tr>
<td>Vinyl Sheet Flooring, Light Tan with Mottle Pattern</td>
<td>Throughout Building – See HM2.01 for locations of removal</td>
<td>RACM</td>
<td>Vinyl Sheet Flooring: ND Paper Backing: 40% CH</td>
<td>600 sf</td>
</tr>
<tr>
<td>Texture on Drywall</td>
<td>Southwest Classroom at Future Shear Wall</td>
<td>RACM</td>
<td>&lt;0.25% CH 400 Point Count Analysis</td>
<td>500 sf</td>
</tr>
<tr>
<td>Fire Door</td>
<td>Anatomy Lab and Southwest Classroom</td>
<td>RACM</td>
<td>ASSUMED</td>
<td>No removal expected²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Sciences Building</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drywall with Joint Compound</td>
<td>Northwest Lab Services Room</td>
<td>RACM</td>
<td>Drywall: ND Joint Compound: 2% CH</td>
<td>No removal – Disturbance Expected³</td>
</tr>
<tr>
<td>Thermal System Insulation, Hard Packed Insulation on 6&quot; Outside Diameter Pipe</td>
<td>Chemistry Lab South Storage Room, West Storage at Water Heater Closet</td>
<td>RACM</td>
<td>30% CH 5% AM</td>
<td>No removal expected¹</td>
</tr>
<tr>
<td>Transite Flue</td>
<td>West Storage at Water Heater Closet</td>
<td>Cat II</td>
<td>ASSUMED</td>
<td>No removal expected¹</td>
</tr>
</tbody>
</table>

#### Physical Sciences North Wing

Contra Costa Community College District
Contra Costa College
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Section 02080 – Page 30
Asbestos Abatement and Disposal
<table>
<thead>
<tr>
<th>Material Description</th>
<th>Material Location</th>
<th>Waste Category</th>
<th>Asbestos Type</th>
<th>Estimated Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 – Drywall with Joint Compound</td>
<td>Throughout</td>
<td>N/A</td>
<td>Drywall: ND</td>
<td>No removal –</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Joint Compound: 2% CH</td>
<td>Disturbance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;0.25% CH – 400 Point Count Analysis</td>
<td>Expected&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>27 – Vinyl Floor Tile, 12”, Gray with Black</td>
<td>Office Service and</td>
<td>Cat. II</td>
<td>Tile: 2% CH</td>
<td>No removal –</td>
</tr>
<tr>
<td>Mastic</td>
<td>Mechanical Room</td>
<td></td>
<td>Mastic: 3% CH</td>
<td>Disturbance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Expected&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Press Box</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinyl Floor Tile, 12”, Light Brown with</td>
<td>Press Box Interior</td>
<td>Cat. II</td>
<td>Tile: 3% CH</td>
<td>100 sf</td>
</tr>
<tr>
<td>Streaks and Brown Mastic</td>
<td></td>
<td></td>
<td>Mastic: ND</td>
<td></td>
</tr>
<tr>
<td>Brown Mastic Associated with</td>
<td>Press Box Interior</td>
<td>Cat. II</td>
<td>&lt;1% TR, Assumed &gt;1% CH</td>
<td>50 lf or 20 sf</td>
</tr>
<tr>
<td>4” Cove Base</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NA = Not Applicable, CH = Chrysotile, TR = Tremolite, RACM = Regulated asbestos containing material (fibrous), Cat. I = Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), Cat. II = Category II Non-friable (note ACM must be reclassified as a RACM if rendered friable during removal), O.D. = Outside Diameter, sf = square feet, lf = linear feet

<sup>1</sup>Removal of ACM is not expected unless location of material is in conflict with required work.

<sup>2</sup>Reinstallation of door planned. Disturbance of assumed mineral core is not expected unless lockset is replaced or new penetration.

<sup>3</sup>Coordinate attachments required through drywall with asbestos finishing compound and/or ACM flooring finishes.

END OF SECTION 02080
ATTACHMENT A
ASBESTOS ABATEMENT WORK PLAN OUTLINE

In accordance with the contract documents, the Contractor is required to prepare a written, site-specific Asbestos Abatement Work Plan, and submit to the District for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the District's facilities and the environment.

I. Location of Work:
The work to be completed under this work plan will be completed at:
(Building name)
(Location within building)
Previous asbestos inspections or surveys have found that ACMs are present at the following locations:
(List all materials and locations to assure the District and the Contractor are aware of all hazardous materials locations)

II. Description of Work:
Describe the anticipated work scope

III. Schedule:
Phase/Task Anticipated Date(s)
Mobilization
Set-up of work area(s), containments
Abatement
Final Cleaning
Visual Inspection
Final Clearance (visual and air sampling)
Teardown
Demobilization

IV. Equipment and Materials
List all equipment and materials to be used, such as the following:
HEPA Vacuums Negative air filtration units
Scrapers Manometers
Power saws Shower facilities
Pry bars Airless sprayers/compressors
Cutting shears Cleaning detergents
Other hand tools Solvents (must be approved by District)
Encapsulants/sealants Roller/brushes
Gloves Disposable coveralls
Respiratory protection Eye & foot protection
Fall Protection Scaffolds/Ladders
Gas/Diesel Powered Equipment

V. Crew
Contra Costa Community College District
Contra Costa College
C-633 Seismic Retrofit Project 1
List all workers and supervisors with emergency contact names and phone numbers.

Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure/contamination controls, and engineering controls. This description should include, but not be limited to, the following:

<table>
<thead>
<tr>
<th>OSHA Class I, II, III and IV work</th>
<th>Wet methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative pressure enclosure</td>
<td>Glovebag removal</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>HEPA vacuums</td>
</tr>
<tr>
<td>Mini-containments</td>
<td>Solvent removal of mastic</td>
</tr>
<tr>
<td>List other procedures</td>
<td></td>
</tr>
</tbody>
</table>

VII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

VIII. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of asbestos-contaminated solid waste and wastewater.

IX. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring and proposed consultant if air sampling requirements are not meet from two consecutive shifts.

X. Containment Diagram

Include a diagram (hand written is acceptable) of the containment(s) showing the containment perimeter in relation to the surrounding areas, locations of negative air machines and exhaust locations, direction of airflow, and decontamination areas.

XI. Waste
Describe how all waste on this project will be packaged, labeled, stored, transported, manifested and disposed.

XII. Preparation of Asbestos Abatement Work Plan

Date Prepared and Prepared By (signature, name and title)
SECTION 02081
LEAD-CONTAINING PAINT REMOVAL AND LEAD-RELATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 COMPLIANCE AND INTENT

A. The Contractor is responsible for repair, to the satisfaction of the District, of surfaces not scheduled for demolition that become damaged as a result of the work. All unscheduled repair work shall be at no increase to contract price.

B. Contractor shall coordinate lead related work with all site requirements related to protection of existing finishes.

C. This project deals with lead-related construction work. It is necessary for the Contractor to coordinate all work with the project drawings and specifications. During all work, provide monitoring and worker protective equipment in accordance with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this specification. Where there is conflict, the most stringent requirement shall apply.

D. The work covered by this specification includes the handling, removal, and proper disposal of lead. All hazardous materials shall be removed and disposed of according to all federal, state and local regulations.

E. Workers conducting lead-related construction work shall have received lead training in accordance with Cal-OSHA requirements and Department of Health Services (DPH) as appropriate.

F. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for lead-related construction work in accordance with this specification.

G. Comply with all federal, state, and local regulations pertaining to lead-related construction work, storage, transportation and disposal; employee health and safety; Contractor certifications; and all licenses, permits, and training.

H. Work on the premises shall be confined to areas designated in the Contract Documents. Materials and equipment shall be stored within areas designated by the District. Should additional space be required, the Contractor shall request permission.
for additional space and shall adequately safeguard occupants from associated health and safety hazards.

I. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to handling, and the subsequent cleaning of contaminated areas.

J. During lead-related construction activities, the Contractor shall protect against contamination of soil, water, plant life, adjacent building areas, and shall ensure that there is no airborne release of dusts. The District may collect air samples in the building and in adjacent areas to evaluate the Contractor’s performance. Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.

K. It is the Contractor’s responsibility to determine the impacts required to lead containing products. The Contractor shall conduct a site visit to determine locations of materials that will require removal or will be disturbed during the seismic retrofit. This section provides appropriate protocols for handling and disposal of lead. All lead-related construction work shall be performed according to the procedures outlined in this specification.

L. Lead containing materials removed during the work activities shall be disposed of in an approved manner complying with all applicable federal, state, and local regulations. Appropriate waste manifests or letters of salvage shall be furnished to the District thereby limiting the District’s liability for improperly salvaged items. Materials are conveyed to the Contractor “as is,” without any warranty, expressed or implied, including but not limited to, any warranty to marketability or fitness for a particular purpose, or any purpose.

1.3 SUMMARY OF LEAD-RELATED WORK

A. General. This contract involves removal of surface finishes and painted components that contain detectable quantities of lead to facilitate the seismic retrofit as outlined in Project #1 C-633. Existing building components with paint coatings are considered lead-containing paint (LCP) unless tested and proven otherwise. See RGA Environmental’s “Limited Hazardous Materials Survey Report” for a summary of painted surfaces tested. The intent of this work and the required procedures is to minimize lead emissions, contamination, and prevent exposure to building occupants, visitors and employees resulting from demolition of finishes, hot work, other painted finish disturbances.

B. Lead-Related Construction Work: The Contractor's lead-related construction work consists of any work activity or task which results in the coincidental removal or disturbance of paints, surface finishes, or other lead containing materials. The Contractor shall determine and implement applicable OSHA worker protection requirements (8 CCR1532.1) and ensure proper clean-up and disposal of any resulting paint chips and lead wastes resulting (including water) from all lead-related construction activities including, but not limited to, the following:
1. Removal of damaged and intact paint from concrete, plaster, drywall, wood, metal and structural and non-structural steel surfaces prior to required contract work.

2. Removal of intact paint from structural or non-structural steel prior to hot work.

3. Hot work that is likely to be vaporized from accessible and inaccessible painted surfaces.

4. Demolition of building finishes with lead containing paint.

5. Work that will impact existing painted surfaces including but not limited to drilling, cutting, removal of existing attachments (fixtures, casework, millwork, electrical, plumbing, telecom, life safety, etc.).

1.4 REGULATIONS

A. The Contractor shall comply with the requirements of the current issue of the following regulations and guidelines governing lead removal, lead-related construction and disposal and other applicable Federal, State, and Local Government regulations. The regulations listed herein are incorporated by reference.

   a. 29 CFR 1926, Construction Standards
   b. 29 CFR 1926.62, Lead in Construction
   c. 29 CFR 1910.94, Ventilation
   d. 29 CFR 1910.134, Respiratory Protection
   e. 29 CFR 1910.1025, Lead
   f. 29 CFR 1910.1200, Hazard Communication
   g. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
   h. 29 CFR 1926.57, Ventilation
   i. 40 CFR Part 50.12, Ambient Air Quality Standard for Lead
   j. 40 CFR Parts 260, 261, 262, 263, 264, 265 and 268, Hazardous Waste Management
   k. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation

2. California Code of Regulations:
   a. 8 CCR Division 1, Chapter 4, Subchapter 4, Construction Safety Orders
   b. 8 CCR 1532.1, Lead in Construction
   c. 8 CCR 1537, Welding, Cutting, and Heating of Coated Metals
   d. 8 CCR 5144, Respiratory Protection
   e. 17 CCR, Division 1, Chapter 8
   f. 26 CCR Division 22, Hazardous Waste

1.5 DEFINITIONS

A. Definitions specific to the work of this section:

1. Abatement: Procedures for control of lead exposures to the Contractor's workers, Employees, Public and the environment by removal, enclosure, and/or encapsulation of lead-containing paints (LCPs), Lead-Containing Construction Materials (LCCMs), and LCP coated components and proper clean up and disposal of resulting lead contaminated dust, chips, debris, and abatement wastes. Also include procedures for control of lead exposures resulting from welding or other hot work on surfaces with LCPs or residues.

2. Action Level (AL): An exposure of 30 \( \mu g/m^3 \) of airborne lead as an 8-hour TWA. When the AL is met or exceeded, certain protective health and safety measures are triggered per 8 CCR1532.1 Lead.

3. Action Levels for Lead Content: The levels of lead concentration established for each type of analysis performed, which if the lead concentration equals or exceeds the action levels specified herein, renders the material hazardous.
   a. Action Level for Toxicity Characteristic Leaching Procedure (TCLP) by EPA 200.7: Action level for TCLP is 5.0 milligrams per liter.
   b. Action Level for Total Threshold Limit Concentration (TTLC) by EPA 6010: Action level for TTLC is 350 milligrams per kilogram.
   c. Action Level for Soluble Threshold Limit Concentration (STLC) by EPA 200.7: Action level for STLC is 5.0 milligrams per liter.

4. Airlock: A system for permitting ingress or egress with minimum air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least three feet apart.

5. Air Monitoring: The process of measuring the lead content of a specified volume of air in a stated period of time.

6. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead.

7. Authorized Visitor: District representatives, District's Environmental Consultant, or a representative of any regulatory or other agency having jurisdiction over the project.

8. Change Room and Shower Facilities: Rooms within the designated boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.

9. Clean Room: An uncontaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

10. Competent Person: An onsite supervisor who has been formally trained in lead abatement and who is capable of identifying lead hazards, substandard and improper lead abatement controls, procedures, practices, and conditions and
who has sufficient experience and authority to take prompt corrective measures to eliminate them.

11. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).

12. District: Contra Costa Community College District.

13. District's Environmental Consultant: Environmental Consulting firm and its representatives retained to provide compliance oversight and monitoring for the Contractor's lead-related construction activities and work.

14. DOP Test: Test of a High Efficiency Particulate Absolute filter (HEPA) system to verify that a minimum of 99.97% of all particles 0.3 microns in diameter are captured by the filter system test must be conducted with dioctylphthalate (DOP) test aerosol in accordance with ANSI Z9.2-1979 and Federal Standard 209-B for Class 100 air and as indicated in UL 586.

15. Eight-Hour Time Weighted Average (TWA): Airborne concentrations of lead averaged over an 8-hour workday to which an employee is exposed.

16. Fixed Object: A unit of equipment or furniture in the Work Area which cannot be removed from the Work Area.

17. Hazardous Waste: Lead paint debris and materials shall be classified as hazardous due to the characteristic of toxicity, as determined by testing in accordance with the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 11. Any substance(s) listed in Article 11 Section 66699 at concentrations greater than their listed Soluble Threshold Limit Concentration (STLC) or Total Threshold Limit Concentration (TTLC) may need to be further characterized by the Toxicity Characteristic Leaching Procedure (TCLP) in accordance with 40 CFR 261 and other tests prior to disposal as a hazardous waste.

18. HEPA Exhaust System: A portable local exhaust system equipped with HEPA filtration and capable of maintaining a constant, low velocity air flow into contained contaminated areas from adjacent uncontaminated areas when used as Differential Pressure Equipment. Also capable of use as local exhaust to control lead fumes generated from hot work.

19. HEPA Filter: A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of lead particles greater than 0.3 microns in diameter.

20. HEPA Vacuum Equipment: High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining lead dust. Filters shall be certified to be of 99.97% efficiency for retaining particles of 0.3 microns diameter or larger.

21. Intact LCP Components: LCP components removed substantially intact with LCP firmly adhering to the surface. Examples are door, door trim, baseboards, etc., with intact paint. Also referred to as architectural debris with intact paint.

22. Lead-Based Paint (LBP): Lead-Containing Paint (LCP) that is at least 0.5% lead by weight when analyzed by AAS or ICP-AES (equivalent to 5000 ppm of lead) or 1.0 milligrams of lead per square centimeter (mg/cm²) as determined
by XRF testing or as identified by specification. LBP is also a Lead-Containing Construction Material (LCCM).

23. **Lead-Containing Construction Materials (LCCM):** Any construction material: (i) containing lead at analytically detectable levels greater or equal to 50 ppm; or (2) containing paints or other finishes with lead at levels greater than 600 ppm; or (3) consisting of paints containing lead at any level capable of posing an occupational or environmental hazard during any phase or process of the current construction or demolition project. Occupational hazards shall be considered evident when airborne exposure levels exceed or are likely to exceed the permissible exposure level (PEL) set by Cal/OSHA. Environmental hazards shall be considered evident when lead surface contamination levels exceed 40 ug/ft² on interior floor surfaces and 400 ug/ft² on exterior surfaces and/or when any of the State or Federal hazardous waste criteria for lead is met or exceeded.

24. **Lead-Containing Paint (LCP):** Any paint or finish coating with a lead content of 0.06% lead or greater. Cal/OSHA regulation requires assessment of employee exposure for all tasks where lead is present at this level or higher. Note: At lead levels below 0.06% exposure assessments are still required for "Trigger Tasks".

25. **Lead Control Area:** An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of LCP removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

26. **Lead-Related Waste:** Paint chips, vacuum dust, and debris, used cleaning articles, waste water, plastic sheets and other disposable items which were used during the LCP abatement process and as a result are considered lead contaminated waste or assumed hazardous waste pending further characterization.

27. **Lead-Impacted Construction:** Any construction activity, excluding abatement, which disturbs lead or lead-containing paints or coatings and which may, under specific circumstances, result in worker and or environmental exposure.

28. **Lead-Related Construction:** Any construction activity or process including but not limited to lead abatement, LCCM (i.e. paint) removal lead-impacted construction, or welding on lead-containing surfaces which may expose workers, building occupants, or the environment to a release of airborne lead or surface lead contamination.

29. **Mini-containment or Mini-enclosure:** A small temporary enclosure constructed of impervious material (such as plastic sheeting) with at least one airlock to permit ingress and egress. The entire Work Area is contained or enclosed by this system to prevent the escape of contamination outside the Work Area.

30. **Permissible Exposure Limit (PEL):** An exposure to airborne lead of 50 micrograms of lead per cubic meter of air (50 µg/m³), averaged over an 8-hour workday which is referred to as a time weighted average (TWA). This is the highest level of Lead in air an employee can be permitted to be exposed to in an eight hour work day. For longer work days, the PEL is lowered and can be determined by dividing 400 by the number of hours worked per day. When the...
PEL is exceeded, the contractor must take action to lower the exposure level and protect the worker per 8 CCR1532.1 Lead.

31. Personal Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour TWA concentration in accordance with Title 8 CCR 1532.1. Samples shall be representative of the employee’s work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulder, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

32. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, “inside boundary” shall mean the same as “outside lead control area”.

33. Qualified Person: The individual identified by the Contractor to be responsible for conducting air sampling, calibration of air sampling pumps, evaluating sampling results, and conducting respirator fit tests.

34. Recognized Training/Educational Institution: University, college, Steel Structures Painting Council, or a professional training organization funded by or meeting U.S. Environmental Protection Agency (EPA) and/or California Department of Health Services (DHS) training accreditation requirements for contractors performing lead-based paint or construction abatement work.

35. Removal: All herein specified procedures necessary to remove and clean-up all LCCM or LCP from the designated areas and to dispose of these materials at an acceptable site in accordance with Federal, State and Local Regulations. Removal of LCP may be by whole painted component or by removing LCP from painted components either onsite or offsite.

36. Trigger Task: Task specifically identified by the CAL/OSHA Lead standard as a potential exposure hazard requiring certain protective measures to be implemented prior to obtaining the results of an initial exposure assessment. Trigger tasks include, but are not limited to, any of the following tasks when materials or paints which contain lead are present and will be disturbed:
   a. Manual demolition
   b. Manual scraping or sanding
   c. Heat gun application
   d. Use of power cleaning tools
   e. Rivet busting
   f. Abrasive blasting
   g. Welding, cutting or torch burning

37. Visually Clean: Free of visible dust, paint chips, dirt, debris, or films removable by vacuuming or wet cleaning methods specified. For outside soil or ground cover areas, visually clean shall mean free of construction or paint debris, chips or dust distinguishable from the initial soil or ground conditions.

38. Washroom: A room or area established outside the Work Area for hand washing at minimum. Where the lead PEL is exceeded, the wash room shall contain a shower facility with hot and cold water and a water filtering system.
39. Wet Cleaning: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been washed with specified detergent solutions and rinsed with clean water.

40. Work Area: A designated and controlled area in which lead abatement actions are undertaken or which may become contaminated as a result of such actions. A Work Area is a controlled area delineated at minimum by barrier tape (or similar means) and signage to restrict access to Authorized Personnel. In some instances, a higher degree of physical isolation and control may be required and specified.

1.6 SUBMITTALS AND NOTICES

A. Requirements are as set forth in the General Conditions and Division 1, for items required to be submitted under this section.

B. Product data shall include manufacturer's product data, specifications, samples and application instructions and other pertinent information necessary.

C. Project procedure submittal for LCP coating removal. Submit the following:

1. Detailed work plan for all lead-related construction including: (a) removal method to be employed; (b) lead contamination controls for each different type of method or work operation involving lead-containing paint removal; (c) equipment and materials proposed to be used on LCP coatings; (d) the procedures and practices for protection of building occupants and the environment; and (e) detailed description of Work Area preparation and containment controls for lead-related construction work, cleaning and decontamination procedures, signage, and security measures. Detailed work plan shall follow the outline in Attachment A – Lead-Related Work Plan Outline.

2. Detailed plan for disposal of lead-contaminated wastes generated by this work in accordance with all applicable Federal, State and Local regulations. Each separate waste stream should be addressed including name of waste stream, methods of handling, packaging, labeling, storage, transportation, and disposal or recycling. For materials to be disposed, indicate the classification of the waste (RCRA hazardous, California hazardous, or non-hazardous).

3. Method of transport of hazardous waste including name, address, EPA I.D. number, and telephone number of the transporter and the name, class, address, EPA I.D. number, and telephone number of hazardous waste site(s) to be utilized for disposal of each waste stream.

4. Proposed location, size and type of secured waste storage containers to be used. Include system that will be used for segregating different waste streams.

5. Detailed schedule for completion of lead-related construction work to be updated on a weekly basis indicating tasks being performed until job completion.

6. Detailed plan for protection of workers conducting lead-related construction work which includes all information required for the CAL/OSHA lead compliance plan per Title 8 CCR 1532.1. At minimum, for each removal
method, the plan shall detail protective clothing and equipment and procedures and worker decontamination facilities and procedures.

D. Project Procedures Submittal for Hot Work on LCP Surfaces

1. Detailed work plan for containment and removal of lead-containing paint, capture of fumes from all hot work including welding and torch cutting on structural steel. Include equipment and materials proposed to remove paint, capture, HEPA filter, and exhaust all lead-containing fumes for protection of workers, building occupants, and the environment.

2. Cal/OSHA lead compliance plan for welders per 8 CCR 1532.1 Lead.

3. Containment requirements as specified in Title 17 CCR Division 1, Chapter 8.

E. Project procedure submittal for lead-related construction demolition (demolition of finishes with lead containing paint or lead containing materials). Submit the following:

1. Detailed work plan for all lead-related construction including: (a) removal method to be employed; (b) lead contamination controls for each different type of method or work operation involving lead-containing materials; (c) equipment and materials proposed to be used on lead containing materials; (d) the procedures and practices for protection of building occupants and the environment; and (e) detailed description of Work Area preparation and containment controls for lead-related construction work, cleaning and decontamination procedures, signage, and security measures.

2. Detailed plan for disposal of lead-contaminated wastes generated by this work in accordance with all applicable Federal, State and Local regulations. Each separate waste stream should be addressed including name of waste stream, methods of handling, packaging, labeling, storage, transportation, and disposal or recycling. For materials to be disposed, indicate the classification of the waste (RCRA hazardous, California hazardous, or non-hazardous).

3. Method of transport of hazardous waste including name, address, EPA I.D. number, and telephone number of the transporter and the name, class, address, EPA I.D. number, and telephone number of hazardous waste site(s) to be utilized for disposal of each waste stream.

4. Proposed location, size and type of secured waste storage containers to be used. Include system that will be used for segregating different waste streams.

5. Detailed schedule for completion of lead-related construction work to be updated on a weekly basis indicating tasks being performed until job completion.

6. Detailed plan for protection of workers conducting lead-related construction work which includes all information required for the CAL/OSHA lead compliance plan per Title 8 CCR 1532.1. At minimum, for each removal method, the plan shall detail protective clothing and equipment and procedures and worker decontamination facilities and procedures.
F. Lead Abatement Personnel Qualification and Protection Submittal. Submit the following:

1. Employee training certifications demonstrating that all employees engaged in LCP removal or hot work activities have attended formal lead hazard and lead-related construction training by a Recognized Training/Educational Institution. All training for other lead-related construction activities shall be in accordance with the worker training provisions in the CAL/OSHA and California Department of Health Services (DHS) lead regulations and this specification:

   a. The minimum acceptable training course duration is 40 hours for the Contractor's lead abatement Supervisor/Competent Person and all workers conducting removal of LCP.

   b. The minimum training course for workers conducting other lead-related construction work shall meet all requirements of 8 CCR1532.1, Lead. Documentation shall consist of training institution certificates or certification by trainer for each employee with dates trained and a copy of the training syllabus.

   c. Updated information shall be provided in advance of on-site lead worker personnel changes.

2. Documentation that all employees engaged in lead-related construction activities or the "Trigger Tasks" have had the appropriate medical examinations specified in Title 8 CCR1532.1 within the prescribed time periods immediately preceding project start-up. It shall be the Contractor's responsibility to secure any and all medical and exposure information releases required for employee records in accordance with regulation. Evidence of medical requirement compliance shall include, but are not necessarily limited to:

   a. Documentation of medical surveillance examination by a licensed medical physician prior to commencement of onsite LCP-related work including baseline blood lead levels performed within the last six (6) months. The baseline blood lead shall have been within the past 30 days.

   b. Statement by the examining physician that employee is fit to wear a respirator in accordance with 8 CCR 1532.1 within the last twelve (12) months.

3. Documentation that all employees required to wear respirators has passed respirator fit tests within the past twelve (12) and has been assigned individual respirators which fit them.

4. Methods, procedures and plan for monitoring employee airborne lead exposure during lead abatement activities. Methods and procedures, at a minimum, shall comply with requirements outlined in Title 8 CCR 1532.1 Lead.

G. Lead Abatement Product and Equipment Submittal. Submit the following:

1. Calibration data showing where secondary standards (rotometer) for personal air monitoring equipment have been calibrated from a primary standard within the last 30 days from the date of submittal.

2. Product data sheets and material safety data sheets (MSDS) for each product proposed for use on this project such as wetting agents, chemical paint removers, detergents, adhesives, and abrasives.
3. Manufacturers certification that HEPA vacuums, HEPA ventilation equipment, and other equipment required to contain airborne dust and fume conform to ANSI Z 9.2

4. Product data sheets for all power tools and equipment used to remove LCP including, but not limited to, heat guns, and vacuum-assisted power tools.

5. Certification that HEPA filter exhaust systems have been DOP tested in-place after installation and been found to provide 99.97% efficient air clearing for particulates greater or equal to 0.3 microns in diameter. All DOP filter certification testing shall be conducted on site by an independent testing firm.

H. Lead Abatement Daily Submittal - submit the following documentation daily to the District or the District's Environmental Consultant within 24 hours of initiation:

1. An accurate daily entry log or roster of all authorized personnel entering and exiting the Work Area.

2. Copies of initial and periodic personnel air monitoring laboratory results and calculated eight hour time weighted average results for each employee monitored shall be provided within 48 hours of sample collection.

3. Provide the District and/or District's Environmental Consultant at least 24 hours notice prior to scheduling start-up of each different by type of lead-related construction operation including chemical paint removal, power tool removal, and welding on lead-containing surfaces.

4. Updated training and medical certifications (as required herein) shall be provided prior to assignment of new personnel and for existing personnel prior to the stated allowable time limits or expiration dates. The allowable intervals since the last medical examination (12 months), blood lead test (6 months), or fit test (12 months), shall not be exceeded.

I. Lead Abatement Close-out Submittal - Submit the following:

1. Provide post-abatement blood-lead test documentation for each worker required to undergo blood lead monitoring prior to or during lead-related work, disposal manifests and records as required herein for project closeout. Each worker transferred or terminated shall have a final blood-lead test within five days of termination or transfer. Each worker shall have a final blood-lead test within five days of project completion.

1.7 DISTRICT'S ENVIRONMENTAL CONSULTANT

A. The District's Environmental Consultant is authorized to provide lead removal and lead-related construction compliance observation and monitoring, testing, and technical oversight services including, but not limited to:

1. Airborne lead monitoring to evaluate the effectiveness of the Contractor's lead dust and fume control work practices, procedures, and dust containment methods. The results from this monitoring shall be used to evaluate the Contractor's personal monitoring data and to evaluate the Contractor's compliance with occupational and environmental regulations.
2. Visual inspections to verify if the Contractor has met the requirements for various phases of the lead-related construction process including Work Area preparation, removal, and clean up and decontamination.

3. Wipe sampling for lead contamination to determine if the Contractor has successfully completed clean up and met the lead-related construction project decontamination completion standards.

B. The cost of the District’s Environmental Consultant will normally be the responsibility of the District except under the following circumstances. The Contractor shall be responsible for the cost of the District’s Environmental Consultant for additional services provided when: (1) the Contractor’s Work Area fails final clearance inspection and/or testing; or (2) additional workdays or workday hours (overtime) are required by the Contractor; or (3) the Contractor exceeds the allowable number of workdays for work completion; or (4) additional services associated with response to an uncontrolled, unauthorized hazardous materials release to the environment by the Contractor’s work or operations.

1.8 CONTRACTOR’S COMPLIANCE AND QUALITY ASSURANCE

A. The Contractor shall have a Competent Person onsite at all times while lead-related construction work is in progress. The Contractor’s Competent Person shall communicate and coordinate with the District’s Environmental Consultant with regard to work schedule, inspections, daily submittals, and compliance issues.

B. The Contractor’s Competent Person shall:

1. Ensure the Contractor’s compliance with the plans and specifications.

2. Conduct worker exposure monitoring using a Qualified Person and provide results to the District’s Environmental Consultant.

3. Conduct daily air monitoring during hot work operations involving LCP or LCCM coating on steel structures to verify that the nearest building occupant locations are not exposed to airborne lead levels in excess of 5 μg/m³ lead per 8-hour work shift or 1 μg/m³ lead per 24 hour period.

4. Pre-inspect Work Areas for compliance and completion prior to notifying the District’s Environmental Consultant of the Work Area’s readiness for inspection.

5. Accompany the District’s Environmental Consultant during Work Area pre-start and clearance inspections upon request.

6. Ensure all of the Contractor’s lead-related construction workers have current valid medical, blood-lead test, training, and respirator fit testing records where required and provide copies of all new or updated records to the District’s Environmental Consultant for approval before assigning the workers to any work within Work Areas.

7. Take timely and appropriate corrective actions to ensure compliance with the lead removal and lead-related construction specifications and to eliminate unsafe, unhealthy, and environmentally unsound work practices regardless of whether or not they are brought to the Contractor’s attention by the District’s Environmental Consultant.
8. Adhere by the Consultant's initial characterization of waste for proper packaging, labeling, storage, transportation, and disposal of waste. Ensure any additional waste testing required is completed and ensure proper storage, shipping and timely disposal of all hazardous waste.

PART 2 - PRODUCTS

2.1 PROTECTIVE COVERING

A. Polyethylene sheets, fire resistant, of 6 mil thickness in size (dimensions) to minimize the frequency of joints.

2.2 CLEANERS

A. For clean up and decontamination, a tri-sodium phosphate (TSP) wash solution containing at least five percent (5%) TSP shall be used. Alternative cleaning and decontamination agents shall be subject to approval by the District and the District's Environmental Consultant.

2.3 TAPE

A. Duct tape (or approved equivalent) two (2) inches or wider, capable of sealing joints of adjacent sheets of polyethylene sheathing and for attachment of polyethylene sheathing to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions.

2.4 CHEMICAL PAINT REMOVAL SYSTEMS

A. Chemical paint removal systems shall be selected on the basis of the type of paint to be removed, the substrate type, and chemical compatibility with new coating systems to be applied. Chemical removal systems shall effectively remove paint without adversely affecting the treated surface's suitability for repainting or adversely affecting the bonding, appearance or durability of the coatings to be applied.

B. Chemical paint removal systems containing methylene chloride are prohibited.

C. Submit manufacturer's product data sheets for each chemical remover for review and approval by the District's Environmental Consultant.

2.5 SPRAY ADHESIVE

A. Provide spray adhesive in aerosol cans which is specifically formulated to stick to sheet polyethylene.

2.6 DISPOSAL CONTAINERS

A. Provide six (6) mil thick polyethylene sheeting, six (6) mil leak-tight polyethylene bags and other impervious containers as required by applicable regulations. All waste shall be labeled as hazardous or potentially hazardous waste unless proven otherwise by appropriate sampling and laboratory analysis.

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2.7 WARNING SIGNS AND LABELS

A. Caution Signs: To be minimum of 20 x 14 inches and includes phrase "Caution Lead Hazard, Keep Out Unless Authorized" in minimum two-inch high letters. These shall be posted at each approach to each lead or removal Work Area or area where lead-related construction hot work is conducted.

B. CAL/OSHA Lead Warning Posters: "Warning - Lead Work Area, Poison, No Smoking or Eating" shall be posted at the entrance to each Work Area.

C. Labels: Hazardous waste shall be labeled according to Federal, State and Local regulations including, but not limited to, the California Code of Regulations, Title 22, Chapter 30 and the U.S. Department of Transportation 49 CFR Parts 172, 173, 178 and 179.

2.8 PERSONAL PROTECTIVE EQUIPMENT

A. Personal protective equipment shall comply with the requirements of Title 8 CCR 1532.1 Lead.

B. Minimum protective clothing and equipment for lead-related construction work shall consist of fire-retardant, disposable, full-body coveralls, disposable boots, gloves, or equivalent in accordance with ANSI Z41. Sleeves at wrists and cuffs at ankles shall be secure.

C. Eye protection and hard hats shall be available and worn at all times and shall conform to ANSI 87.1 and ANSI 89.1

D. The Contractor shall provide Authorized Visitors with suitable disposable protective clothing, headgear, respirators, and footwear whenever authorized visitors are required to enter the Work Area. Up to an average of ten sets per day of suitable personal protective equipment shall be made available for authorized visitors.

E. All disposable clothing worn during each work shift shall be removed prior to exiting the Work Area and shall be properly segregated and placed in container for proper waste characterization. The Contractor shall bear full responsibility for additional costs associated with waste profiling and disposal if wastes are not properly segregated.

2.9 RESPIRATORS

A. Provide workers with personally-issued respiratory equipment approved by NIOSH and suitable for the lead exposure level in the Work Area. Where respirators with disposable filters are employed, provide sufficient filter for replacement as required by the worker or applicable regulation. Each respirator shall be washed whenever the worker wearing it showers or at least daily prior to storage. The following general conditions shall apply to respirator use:
1. All respirators used must be certified by NIOSH and a respirator program shall be established and implemented.

2. Respirators shall be used whenever airborne lead concentrations will exceed, or are likely to exceed, 50 µg/m³, and for any of the Trigger Tasks which have not been demonstrated to be below the PEL by initial monitoring, and for all operations involving the removal of LCP or welding on surfaces with paint or lead contamination regardless of airborne lead concentrations.

3. Prior to initial monitoring, the level of protection shall follow CAL/OSHA requirements for the specific Trigger Task. Otherwise, the respirators worn shall be selected based on measured or reasonably expected airborne concentrations of lead as follow:
   a. Half-face negative pressure air purifying respirator: up to 500 µg/m³
   b. Powered air purifying respirators: up to 50,000 µg/m³
   c. Type C supplied air respirator full face piece pressure demand mode: up to 100,000 µg/m³

4. Disposable respirators are not acceptable at any time. It is always permissible to upgrade to a more protective type of respirator.

5. During all segments of LCP removal and clean up activities and hot work on LCP coated surfaces, respirator usage shall be required of all persons within the designated Work Areas at all times regardless of airborne lead concentrations.

B. The Contractor is responsible for determination of airborne lead concentration levels for the Contractor's personnel and for providing and enforcing use of appropriate personnel respirator protection based upon airborne lead concentrations and this specification.

C. Respirators shall not be removed inside the Work Area. Workers shall proceed to the designated washing area and clean the external surface of the respirator body before removing the respirator.

2.10 TOOLS AND EQUIPMENT

A. Provide suitable tools for the removal of LCP and LCCM contamination including required HEPA exhaust systems, HEPA exhausted portable welding fume control systems, HEPA vacuums, ground fault circuit interrupters (GFCIs), ladders, scaffold, garden sprayers and portable eyewash systems. All tools and equipment brought onsite shall be clean and free of lead and other hazardous material contaminants. HEPA vacuums shall be labeled with a lead warning label and dedicated to LCP work to prevent commingling of lead wastes with asbestos or other wastes. HEPA filtered exhaust systems shall be DOP tested on site to verify 99.97% effectiveness as an installed system and shall have accurate manuhalic gages to indicate filter performance while in use. Provide sufficient back-up equipment for use in the event of equipment failure. Ensure all equipment has been fitted with any necessary feasible noise attenuators to meet occupational and environmental noise standards for building occupants.
B. Provide enough support equipment, including but not limited to, lumber, nails, hardware, shower stalls, hoses, plumbing, drain pans, sump pumps, and waste water storage drums to construct and operate the required hand washing system and portable Wash Room with showers. The number of showers shall be sufficient for the number of workmen scheduled on the job. The water hose used to connect the drain to the showers will not be used for any other purpose. The supply side water hose shall have a check valve to prevent back-flow under any circumstance.

PART 3 - EXECUTION

3.1 GENERAL

A. Public Warning and Safety Information to be Posted
   1. Post signs at all approaches to the lead Work Area entrance to read “Caution Lead Hazard Keep Out Unless Authorized.” In addition, post the CAL/OSHA Lead Hazard Warning Poster at the immediate Work Area entrance.
   2. A list of phone numbers for the local hospital and for emergency squad, the local fire department, a representative of the Contractor who may be reached 24 hours a day, the Contractor’s main office, the District and the District’s Environmental Consultant and any other professional Consultants directly involved in the project.

3.2 GENERAL PREPARATION FOR INTERIOR LEAD REMOVAL AND LEAD-RELATED CONSTRUCTION

A. Move all non-fixed objects out of the Work Areas. Such items shall be moved at least five (5) feet from Work Areas.

B. Pre-clean entire floor area and all horizontal surfaces inside and within five (5) feet of the Work Area using HEPA vacuums and wet methods.

C. Cover all non-moveable objects within five (5) feet of the Work Area with six (6) mil polyethylene sheeting and seal with duct tape.

D. Cover all floor, deck, scaffold or work platforms within the Work Area with two layers of six (6) mil polyethylene sheeting and seal with duct tape. Shut down, lock out, isolate the HVAC systems that supply, exhaust or pass through the lead control area. All heater vents and registers shall be sealed with six (6) mil plastic sheeting and duct tape.

E. Contain lead paint removal operations and hot work where lead containing paint is not completely removed at least 12” from welding or torch cutting in all direction with the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust.

F. Provide, at minimum, 10 foot candle illumination lighting to the Work Area.

G. Install lead caution signage at each approach to the lead-related construction Work Area and lead warning signage just outside each Work Area entry/exit point.
H. When Work Area preparation is complete, notify the District’s Environmental Consultant and request an inspection. No work is to proceed in any Work Area until the general Work Area preparation materials, methods, and procedures have been inspected and approved by the District’s Environmental Consultant.

3.3 GENERAL PREPARATION OF THE EXTERIOR LEAD REMOVAL OR LEAD-RELATED CONSTRUCTION

A. Cordon off the Work Area extending at a minimum of 10 feet horizontally beyond the area of lead-related construction with barrier tape and warning signs as specified herein.

B. Pre-clean visible suspect lead-containing dust and debris around and under areas where LCP or LCCM will be removed. Used HEPA vacuums and wet methods to perform this cleaning which shall include, at minimum, the designated Work Area.

C. Cover ground and horizontal surfaces of Work Area (area within barrier tape) with a minimum of two layers of six (6) mil polyethylene sheeting. Secure the poly on the ground to the largest extent feasible. Horizontal surfaces include scaffolding and/or other work platforms. Extend the plastic from the foundation to 10 feet beyond the Work Area. Seal all seams with tape and secure plastic to prevent undesired movement. Protection of horizontal surfaces shall be constructed to contain any water used to prepare exterior surfaces for re-painting.

D. Protect windows, doors, and openings within the regulated area to the interior of the building with a minimum of one layer of 6-mil poly.

E. Where LCP or LCCM components are likely to generate airborne dust or paint chips, devise a suitable containment to contain such dust and prevent dispersal by wind. Exterior removal which generates LCCM or LBP dust and debris shall not be attempted when wind is greater than 15 mph. To conduct exterior removal under windy conditions, the Contractor shall implement special, safe and effective countermeasures to ensure containment of LCP or LCCM dust and debris. These countermeasures include but are not limited to protective shrouds, mini-containment, or full scale containments on work platforms or scaffold.

F. Provide a designated entry/exit point to exterior Work Areas suitable for workers to properly decontaminate and exit from the Work Area as specified herein. Install lead caution and warning signage as specified above.

G. Notify the District’s Environmental Consultant when the Work Area is ready for inspection at the startup of each lead-related construction process not previously evaluated and approved by the District’s Environmental Consultant. Lead-related construction work shall not initially proceed until the District’s Environmental Consultant has checked and approved Work Area preparations.
3.4 WORKER PROTECTION AND DECONTAMINATION PROCEDURES

A. The Contractor shall use only workers medically-qualified and trained for lead-related, hot work on LCCM surfaces, and respirator usage.

1. Medically-qualified shall mean that the worker has had an occupational medical exam for lead exposure and respirator usage within 12 months of abatement start-up.

2. The contents of the exam must be in conformance with Title 8 CCR 1532.1. In addition, each worker shall have had a blood-lead test within 30 days of starting work on the project. At no time shall the worker exceed six months between each blood-lead testing.

3. Each abatement worker shall have successfully completed formal documented training in lead hazards and lead abatement methods meeting Title 17 California Department of Public Health (DPH) requirements. Non-abatement workers performing lead-related construction work shall have documented lead training in accordance with Title 8 CCR 1532.1.

4. The Contractor's Competent Person for lead-related construction shall have received at least 40 hours of formal training by a Recognized Training Education Institution in lead hazards and lead abatement.

5. The Contractor shall ensure that no worker is allowed onsite to perform lead removal or lead-related construction work until the District’s Environmental Consultant has received and approved all of the worker’s medical, training and fit testing certifications.

6. Each worker and Authorized Visitor shall, upon entering the job site, enter the designated clean change room area and put on an inner and outer set of full body reusable or disposable coveralls, boots and shoe covers, respirator with HEPA filters, and gloves before entering the Work Area.

7. Each worker and Authorized Visitor shall HEPA vacuum contamination from protective clothing and then remove shoe covers before leaving one Work Area for another Work Area inside the same building unless the Work Areas have been interconnected with a secured plastic sheet runway at least three feet wide.

8. When exiting a Work Area, proceed to vacuum off all reusable work clothing and dispose of outer disposable protective clothing as suspect lead waste. Proceed to a designated wash area, remove and clean the respirator and store in a clean container.

9. At the end of the work day, all workers are to do the following in addition to those procedures described above: Place disposable outer garments and shoe covers in separate labeled waste containers dedicated to PPE for proper waste characterization; remove inner disposable clothing and place in waste containers; clean protective gear including respirator, shower or wash hands and face at minimum, and put on clean street clothes in the clean room area.

10. All tools and equipment shall be decontaminated by HEPA vacuuming and wet wiping prior to being taken out of the Work Area. Tools and equipment with inaccessible internals shall be externally wet-wiped, bagged and sealed prior to being removed from the Work Area.
11. Workers shall not eat, drink, smoke, or chew gum or tobacco at the work site within 20 feet of any Work Area as specified by the District or the District's Environmental Consultant.

12. Provide and post the decontamination and work procedures to be followed by workers in the clean area.

13. Each worker shall have a final medical blood-lead laboratory test within one week of job completion and before engaging in other lead-related work.

3.5 REMOVAL OF LEAD-CONTAINING PAINT BY CHEMICAL REMOVAL

A. Removal of LCP using Chemical Removal system shall be approved for use by the District's Environmental Consultant.

B. The Contractor shall provide additional security measures as necessary to ensure occupants cannot gain access to chemicals and chemically-treated surfaces.

C. Material safety data sheets for each chemical substance and product used shall be onsite at all times and available for review by the workers and District's Environmental Consultant.

D. The Competent Person shall review the contents of the material safety data sheets and the safe removal procedures with the workers prior to chemical removal.

E. Workers shall wear chemical goggles, face shields, impervious gloves, aprons, and booties over the standard protective clothing prior to starting chemical removal.

F. Stage or install temporary emergency eyewash capable of providing a 15-minute flush within the immediate Work Area if corrosive organic or corrosive inorganic paint removal (stripping) products are used. In addition, an emergency shower shall be available onsite within 50 feet of the removal operation.

G. Chemical stripping agents (and neutralizers) shall be applied in accordance with the recommendations of the manufacturer. Remove all paint down to the bare substrate. Ensure that the chemicals used and the associated removal methods leave a clean and smooth surface capable of accepting a suitable primer/sealer coating after final cleaning. No paint or chemical residue shall be visible on the bare metal surfaces to be welded. All chemical residues shall be removed from surface applied.

H. Containerize all paint and chemical waste in impervious containers labeled as hazardous waste.

I. Package all contaminated rags and protective equipment, and disposable cleaning items and plastic sheets in labeled impervious containers and transfer waste containers to secure waste storage units. The Contractor shall assume all such waste to be hazardous unless proven otherwise by objective waste characterization data.

J. Clean and decontaminate the Work Area in accordance with the procedures outlined herein.
K. Decontaminate all tools and equipment before removing them from the Work Area. Seal or bag-up such equipment for transfer to the next Work Area or operation.

3.6 REMOVAL OF LCP BY MECHANICAL REMOVAL

A. All mechanical removal equipment and systems shall be approved by the District's Environmental Consultant. Such equipment includes but is not limited to needle guns, abrasive wheels, and rototape equipment.

B. All power tools shall be designed and equipped with effective HEPA-filter exhaust systems.

C. The Contractor shall submit a separate work plan for containment of lead dust and debris emissions released by vacuum assisted power tools.

D. Work Area preparation and LCP removal shall be in accordance with the approved work plan.

3.7 LCP REMOVAL BY ABRASIVE BLASTING METHODS

A. All abrasive blasting equipment shall be of the vacublast type with effective capture and control of dust and debris using a built-in local HEPA Exhaust System. Alternative abrasive blasting systems are subject to approval by the District's Environmental Consultant.

B. The Contractor shall submit a separate work plan for containment of fugitive dust and debris emissions. The plan shall include all equipment and products to be used.

C. The Contractor shall be responsible for all permits and notices required for full compliance with local Air Pollution Control District rules and regulations.

D. No work shall proceed until an approved abrasive blasting containment plan is approved and in place.

E. Upon approval of a work plan and completion of Work Area preparation the Contractor shall conduct a pilot test to demonstrate the effectiveness of the hazardous control measures and the acceptability of the final product.

F. The District's Environmental Consultant shall review the results of the pilot test prior to approving this method for remaining abatement work.

3.8 CLEANING AND DECONTAMINATION OF REMOVAL WORK AREAS

A. Daily Clean up: Perform the following clean up procedures daily.
   1. Clean Work Areas until they are free of loose dust and debris to the satisfaction of the District's Environmental Consultant using HEPA and/or wet-wiping after pick-up of large debris.
   2. Wet debris with a fine mist of water and collect material. All material to be properly segregated, bagged in 6-mil plastic bags, sealed, and moved to a designated, secure, waste storage area for waste characterization.
3. At the end of each work day the Contractor's Competent Person shall inspect work performed that day to ensure the work has been completed and no dust or residue remains on the areas removed and/or in the Work Area. The District's Environmental Consultant shall be included in that inspection process when and if they request inclusion.

B. Final Clean up and Decontamination of Abatement Work Areas: At completion of abatement perform cleaning as follows:

1. Remove all visible dust and debris as specified above.

2. Clean all Work Areas where abatement was performed by vacuuming all surfaces with a HEPA vacuum followed by wet-wiping with a high phosphate (trisodium phosphate) wash or equivalent. The Contractor shall spray surfaces with a 5-10 percent trisodium phosphate (or approved equivalent) cleaning solution applied with a garden sprayer and wipe or mop surfaces with frequently changed clean towels, rags or mops.

3. Disassemble and remove containment barriers at each Work Area location after cleaning as specified above. Place polyethylene sheeting and tape into waste bags and remove to the temporary waste storage area.

4. Remove six (6) mil polyethylene sheeting on immovable objects and floors (where present) after misting with a high phosphate wash and wet-wiping. Place polyethylene sheeting and waste rags in segregated six (6) mil plastic bags, seal and store in a designated, secure, waste storage area for waste characterization.

5. The cleaning procedure used shall prevent spread of contamination and effectively clean surfaces while producing minimal waste.

6. All tools and equipment shall be sealed in six (6) mil plastic bags after being decontaminated using a high phosphate wash and wet-wiping prior exiting the Work Area.

7. Liquid cleaning wastes shall be filtered prior to containerizing for temporary storage pending hazardous waste characterization. Filter systems shall be able to remove particulate two microns and larger in diameter. Permits, if required, are the responsibility of the Contractor.

8. At least eight hours prior to completion of the first Work Area and again upon completion of final clean up and decontamination, notify the District's Environmental Consultant to obtain a final clearance inspection and testing.

3.9 FINAL CLEARANCE INSPECTION AND TESTING OF REMOVAL WORK AREAS

A. Interior Clearance Inspection and Testing.

1. After the final clean-up of each Work Area by the Contractor, the District's Environmental Consultant may conduct a visual inspection to ensure that all visible dust and debris has been removed. Contractor shall provide the District's Environmental Consultant at least eight hours notice prior to scheduling final inspections of each Work Area. If the results of the final visual inspection are satisfactory, the District's Environmental Consultant may proceed to collect clearance dust wipe samples.

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and Lead-Related Construction
2. If the Work Area is not visibly clean, as determined by the District’s Environmental Consultant, the Contractor shall re-clean and decontaminate the Work Area as described herein at his own cost until the Work Area passes inspection.

3. The visibly clean Work Area shall not contain surface lead contamination at or in excess of 40 micrograms of lead per square foot for interior floor surfaces and 400 (µg/ft²) of surface sampled for exterior surfaces. Dust wipe samples will be taken using the HUD sampling protocol by the District’s Environmental Consultant prior to or subsequent to the lead abatement or lead-related construction activities to assess adequacy of the Contractor’s cleaning and decontamination procedures at the discretion of the District’s Environmental Consultant.

4. Dust wipe samples will be collected using commercial wipes moistened with a non-alcohol wetting agent. Areas of approximately one square foot will be selected from horizontal surfaces below or adjacent to where LCCM’s components or paint has been removed.

5. At a minimum, one dust wipe sample will be collected per representative abated area and sent under proper chain of custody protocol to an AIHA or ELLAP accredited laboratory or equivalent as specified by the District’s Environmental Consultant.

6. All dust wipe samples will be analyzed for lead using either AAS or ICP-AES for lead and results will be provided to the Contractor within two days of receipt of sample results.

7. If any of the dust wipe samples exceed the clearance criteria, the entire Work Area must be cleaned and re-tested until the clearance criteria are met.

8. If a Work Area fails the clearance criteria specified above, the Contractor shall re-clean the entire Work Area at no additional cost and shall be responsible for any additional cost incurred by the District’s Environmental Consultant for failed clearance tests. The Contractor shall pay all laboratory and delivery charges for additional dust wipe samples taken in each Work Area upon clearance failure.

B. Exterior Clearance Inspection. After the final clean-up by the Contractor, the District’s Environmental Consultant shall conduct a visual inspection to ensure that all visible dust and debris has been properly removed. The Contractor must provide the District’s Environmental Consultant at least eight hours notice prior to scheduling final inspections. If the results of the final visual inspection are satisfactory to the District’s Environmental Consultant, then the exterior Work Area shall be released for unrestricted access. If the results of the inspection are unsatisfactory the contractor shall re-clean and decontaminate the Work Area prior to requesting another inspection by the District’s Environmental Consultant.

3.10 LEAD-RELATED CONSTRUCTION WORK

A. Where the Contractor’s work requires demolition of lead containing materials, materials coated with LCP the Contractor shall take the following precautions:

1. Cordon off the work area with caution tape and lead warning signs.

2. Protect workers in conformance with Title 8 CCR1532.1.
3. Place a plastic drop cloth below the area where LCP paint chips or dust is likely to be released.
4. Remove components using wet methods and/or HEPA vacuuming to control dust generated by mechanical cutting and/or disassembly. If torch cutting is required, remove the existing paint on all surfaces back at least 12 inches or more in each direction from the hot work as specified herein.
5. Clean-up lead containing paint chips, dust, and debris as the removal proceeds and at the completion of work using HEPA vacuums and/or wet wiping. Clean all tools and equipment prior to removing them from the Work Area. Clean all polyethylene sheeting and horizontal surfaces prior to removing the sheeting.
6. Special precautionary controls shall be used as necessary to prevent lead dust, debris or fume from being carried or blown out of the controlled area by wind or air currents. Torch cutting of components with inaccessible paint shall be done with HEPA filtered local exhaust ventilation to capture fumes unless monitoring data reviewed and accepted by the District's Environmental Consultant indicates local exhaust is not necessary.

3.11 LEAD CONTAMINATION OF BUILDING INTERIOR OR ENVIRONMENT

A. In the event that removed LCCM paint, dust, or debris is not properly contained within the Work Area and thereby escapes, bypasses or penetrates established barriers, the Contractor shall stop work immediately, notify the District's Environmental Consultant immediately, and commence clean-up and decontamination procedures as described herein or directed by the District's Environmental Consultant.

3.12 WASTE STORAGE, SEGREGATION, AND CHARACTERIZATION

A. The Contractor shall provide for secure onsite temporary storage of LCP or LCCM related waste. Waste storage location, equipment, containers and methods are subject to prior approval by the District and the District's Environmental Consultant.

B. All lead-related waste streams and waste categories shall be considered hazardous until proven otherwise through testing by the Contractor. The Contractor shall be responsible for segregating waste into the below listed categories at minimum. If the Contractor allows different waste stream to become co-mingled, the waste will be classified as hazardous if any single component waste stream is hazardous.

1. LCP removed by chemical stripping.
2. LCP removed by mechanical methods.
3. Demolition debris including painted plaster, wood, and metal with lead containing paint.
4. Lead containing ceramic tile
5. Paint (LCP) chips, dust and debris, HEPA vacuum waste.
6. Plastic sheeting and tape.
7. Disposable Protective Clothing and Equipment (PPE).
8. Cleaning Rags.
C. Intact LCP components: Architectural debris with intact LBP shall be considered hazardous until proven otherwise through testing.

D. Each lead-related waste produced shall be placed in properly segregated, labeled and sealed, impervious containers.

E. Removed intact LCP components shall be properly segregated, wrapped in six-mil polyethylene sheeting, labeled and securely sealed with duct tape or placed in a lined bin.

F. All waste containers, bags, and packaged waste shall be stored in a designated, secure, locked waste storage area and be labeled with the following information:
   1. Waste Category: Lead
   2. Date Accumulated: (Insert Date)
   3. Name, address: (Insert Facility Name and Address)
   4. Origin of waste: (Insert Waste Stream Name, i.e. Paint Chips, Vacuum Bags)

G. HEPA vacuum and wet-wipe the exterior of all waste containers prior to removing them from the Work Area to the designated storage area.

H. Each category of waste, except components with intact paint, will be tested and characterized by the District's Environmental Consultant using one or more of the following testing protocols:
   1. CAL/EPA testing protocol: Criteria
      a. Total Threshold Limit Concentration (TTLC): 1,000 ppm lead
      b. Soluble Threshold Limit Concentration (STLC): 5 ppm lead
   2. Federal-EPA testing protocol:
      a. Toxicity Characteristic Leaching Procedure (TCLP): 5 ppm lead

I. Based on the testing protocols, any waste greater than or equal to five (5) ppm lead using STLC or TCLP tests or any waste greater than or equal to 1,000 ppm lead using the TTLC test shall be considered a hazardous waste.

J. When the TTLC test result is less than 50 ppm lead, no further testing is required for that waste category sampled unless the waste stream or waste generating process changes. A minimum of four samples will be taken to represent each category of waste generated. It will be the responsibility of the District's Environmental Consultant to ensure representative samples are taken by the Contractor from each category of segregated waste.

K. The Contractor shall package, store, handle, transport and dispose of each category of waste generated based on the testing results unless specific written direction is provided by the appropriate regulatory agency and reviewed and approved by the District's Environmental Consultant. In all cases, the landfill shall be subject to approval by the District's Environmental Consultant.

L. Upon verbal request of the District's Environmental Consultant, the Contractor shall provide samples of lead related waste to the District's Environmental Consultant.
The Contractor shall provide samples within full view and presence of the District's Environmental Consultant.

M. The cost of waste characterization or waste profiling required by the approved landfill will be the responsibility of the Contractor.

3.13 HAZARDOUS WASTE DISPOSAL:

A. Site Storage and Handling:

1. The Contractor shall pay strict attention to the requirements of 40 CFR 262 and 265 and Title 22, Chapter 30 for the onsite handling of lead waste/debris, with special attention given to the time of storage, amount of material stored at any one time, use of proper containers, and personnel training. All waste shall be stored in secure, locked, labeled, sealed impervious containers and not placed on the unprotected ground. All containers shall be shielded adequately to prevent dispersion of the debris by wind or rain and shall be labeled as hazardous waste. Any evidence of improper storage shall be cause for immediate shutdown of the project until a corrective action is taken.

B. Transportation and Disposal of Waste:

1. The Contractor shall arrange to have the LCP waste and debris transported from the site in accordance with the requirements of 40 CFR 263 and 264, and disposed of properly in accordance with 40 CFR 268, GISO 8 CCR Articles 40 and 41, 49 CFR Parts 172, 173, 178, and 179 and Title 22, Chapter 30, Articles 5, 6, 6.5 and 8.

2. The Contractor shall submit to the District and the District's Environmental Consultant the Name, Class, and EPA I.D. Number of the waste disposal site(s) to be used for each waste category which has been determined by testing to exceed the hazardous waste thresholds provided herein.

3. The Contractor shall prepare waste shipping manifests for review by the District and the District's Environmental Consultant. Upon waste or material pickup by the selected waste transporter, manifests shall be signed by the District and copies retained to verify that all steps of the handling and disposal process have been completed properly.

4. Copies of the landfill weight tickets shall be provided to the District and the District's Environmental Consultant to verify the amount of waste disposed of at that site. The Contractor shall be responsible for all costs associated with transportation and disposal of all wastes generated at the result of this work.

C. No waste characterized as hazardous waste shall be stored onsite for more than 90 days prior to being properly transported for disposal.

D. All equipment, materials, and waste generated on this project must be removed offsite to their proper locations by the Contractor within 14 calendar days from removal and lead-related construction work completion.

E. Containers to be loaded for transportation from the storage area must be removed by workers who have entered from uncontaminated areas, dressed in clean coveralls.
3.14 STOP WORK ORDERS

A. The District and/or the District's Environmental Consultant has the authority to stop work if it is determined that conditions or procedures are not in compliance with the specifications and/or applicable regulations; to the extent of potential endangerment of building users, workers, building occupants, District employees, the public or environment. The work stoppage shall remain in effect until conditions have been corrected and corrective measures have been taken to the satisfaction of the District and the District's Environmental Consultant. All standby time and testing costs required to correct the above mentioned problems shall be borne solely at the Contractors expense. Examples of such conditions that might result in a work stoppage include but are not limited to:

1. Uncontrolled visible emissions which escape the established Work Area or breach physical protective barriers within the Work Area; and/or,

2. Ambient airborne levels of lead outside the construction area at more than 15 micrograms per cubic meters of air (ug/m³) of lead averaged over an eight-hour work period or 5.0 ug/m³ for any 24 hour period. Measurements of the ambient airborne lead levels shall be made outside the immediate Work Area and at the nearest occupied areas.

3. Unsecured Waste Storage Area and/or improper containment of lead abatement waste or LCP contamination.

3.15 CLOSEOUT

A. Prior to approval of payment request, the Contractor must provide the following information:

B. Copies of workers' post-abatement medical test results and performed in accordance with Title 8 CCR 1532.1 Lead.

C. Copies of hazardous waste manifest, profile sheets and weight tickets for all hazardous waste and for all non-hazardous waste or waste recycle receipts.

D. All surface damages during the work must be restored to their original condition except those surfaces scheduled for demolition as part of the renovation project.

END OF SECTION 02081
ATTACHMENT A
LEAD-RELATED WORK PLAN OUTLINE

In accordance with the contract documents, Cal-OSHA Lead in Construction Standard (Title 8 CCR 1532.1) and DHS (17 CCR Division 1, Chapter 8), the Contractor is required to prepare a written, site-specific Lead Compliance Plan, and submit to the District for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA and DPH requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the District's facilities and the environment. All contractors performing lead-related construction work shall prepare plans.

I. Location of Work:
The work to be completed under this work plan will be completed at:
(Building name)
(Location within building)

II. Description of Work:
Describe the anticipated work scope, including:
A. Paint removal (list paints or coatings, and locations)
B. Paint stabilization or encapsulation (list paints or coatings, and locations)
C. Removal and/or replacement of lead-coated components (list components and locations)
D. Dust/residue removal or decontamination (list materials and locations)
E. Demolition of lead-coated components
F. Any other activities that will or may result in worker exposures to lead

III. Schedule:
Phase/Task Anticipated Date(s)
Mobilization
Set-up of work area(s), containments
Lead-related construction
Final Cleaning
Visual Inspection
Final Clearance (visual and sampling)
Teardown
Demobilization

The competent person, ______________, will conduct worksite visual inspections on a daily basis, or more often as necessary.

IV. Equipment and Materials
List all equipment and materials to be used, such as the following:

HEPA Vacuums Negative air filtration units
Scrapers Manometers
Power saws Shower facilities
Pry bars Airless sprayers/compressors
Cutting shears Cleaning detergents
Other hand tools Solvents (must be approved by District)
Encapsulants/sealants          Roller/brushes
Gloves                          Disposable coveralls
Respiratory protection          Eye & foot protection

V. Crew
List all workers and supervisors with emergency contact names and phone numbers.

Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure/contamination controls, and engineering controls. This description should include, but not be limited to, the following:

Location, size, layout & detail of work
Negative pressure enclosure
Respiratory protection
Vacuum assisted blasting
Containment (i.e., poly barriers)
Methods to assure safety of bldg occupants
Removal method to reduce lead dust generation

Wet methods
Local exhaust ventilation for tools
HEPA vacuums
General room ventilation
Interface of trades involved
Pollution control

VII. Technology To Be Used In Meeting the OSHA PEL

List all or any specialized equipment to be used to meet the PEL.

VIII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

IX. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of lead-contaminated solid waste and wastewater.

X. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

XI. Medical Surveillance Program
SECTION 02082

PCB CONTAINING MATERIALS ABATEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.
B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.02 COMPLIANCE AND INTENT
A. This Section specifies requirements for abatement of Polychlorinated Biphenyl (PCB) containing materials. The Contractor shall coordinate all abatement work with the specifications. During all work, provide monitoring and worker protective equipment in accord with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this section and all other sections of the Specifications. Where there is conflict, the most stringent requirement shall apply.
B. The work covered by this specification includes the removal of PCB containing materials including lighting ballasts of fixtures that will not be reinstalled.
C. All work shall comply with Environmental Protection Agency (EPA) rules and regulations governing PCBs: 40 CFR 761, as published in the most recent edition of the Federal Register. Additionally, all work and work related practices shall comply with applicable Federal, State and local rules and regulations including, but not limited to, the California Department of Industrial Relations, California Code of Regulations (CCR) Title 8; Department of Health Services, CCR Title 22 and California Health and Safety Code, Division 20. Where conflicts occur, compliance shall be based upon the most stringent requirements.
D. Workers involved in the removal of PCBs shall have received specific training on the hazards, appropriate personal protection and decontamination procedures associated with PCBs.
E. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for PCB abatement in accordance with this section of the Specifications, other sections of the Specifications and other documents included in the contract.
F. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to hazardous materials abatement, handling, and the subsequent cleaning of contaminated areas.
G. Perform appropriate waste profile testing for all PCB contaminated waste as required by the Specifications, the regulations, and the selected landfill(s). All testing shall be done in the presence of the District or District's designated representative. Chain-of-custody forms shall be provided to the District within one (1) day following sample delivery to the laboratory.
H. During removal activities, the Contractor shall protect against contamination of soil, water, plant life, adjacent building areas, and shall ensure that there is no release of hazardous materials and dusts. The Owner or Owner's designated representative may collect air, bulk, and/or wipe samples in adjacent areas to evaluate the Contractor's performance.
Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.

I. It is the Contractor's responsibility to determine the quantities of hazardous materials impacted by the planned work. The Contractor shall conduct a site visit to determine exact locations of materials impacted by the work.

J. Hazardous materials removed during the abatement activities shall be handled, transported and disposed of in accordance with all applicable federal, state and local regulations.

1.03 DEFINITIONS

A. Certificate of Disposal: The document provided to the generator certifying that the PCB wastes were disposed of in strict accordance with all applicable Federal, State and Local regulations.

B. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample/samples from the moment it is collected, transported, analyzed, and ultimately stored in an archive.

C. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.

D. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.

E. DOP: Diocetylphthalate, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.

F. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.

G. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.

H. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.

I. Manifest: The document authorized by both Federal and State authorities for tracking the movement of PCB containing wastes.

J. PCB Liquid Waste: Any liquid identified to contain PCB through laboratory analysis at a concentration equal to or exceeding 500 PPM.

K. PCB Solid Waste: Any solid that comes in direct contact with PCB liquids which cannot be decontaminated and any solid materials generated as the result of PCB Spill clean-up operations.

L. PCB-Contaminated Liquid Waste: Any liquid identified to contain PCB through laboratory analysis at a concentration greater than or equal to 50 PPM and less than or equal to 499 PPM or those liquids the USEPA requires to be assumed at 50-499 PPM in the absence of testing.

M. PCB Contaminated Solid Waste: Any solid that comes into direct contact with PCB Contaminated liquids which cannot be decontaminated and any solid materials generated as the result of PCB Contaminated spill clean-up operations.

N. PCB Containing Wastes: Any wastes either tested and found to contain PCB greater than or equal to 50 PPM or those requiring assumption under 40 CFR 761. These wastes
include both PCB and PCB-contaminated liquids (including all flushing wastes) and solids.

O. PCB Bulk Product Waste: Materials (such as sealants) found to contain PCBs greater than or equal to 50 PPM.

P. PCB Remediation Waste: Building materials impacted with PCBs from direct contact with a PCB containing material.

Q. PCB Spill: The intentional and/or unintentional spills, leaks, and other uncontrolled discharges where the release results in any quantity of PCB, running off or about to run off the external surface of the equipment; and the contamination resulting from those releases.

R. Polychlorinated Biphenyl (PCB): Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance.

S. Powered Air Purifying Respirator (PAPR): A full facepiece respirator that has the breathing air powered to the wearer after it has been purified through a filter.

T. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

U. Returned Manifest: An original duplicate copy of the manifest provided to the PCB Waste generator within forty-five (45) days of the transport date which acknowledges the receipt of the material at the disposal facility.

V. Visual Inspection: A visual inspection by Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible PCB material, debris, and dust.

1.04 PCB CONTAINING MATERIALS

A. Suspect-PCB containing materials must be removed prior to removal of lighting fixtures that will not be scheduled for reuse. Coordinate ballast verification and removal with the contract documents. Contractor shall be responsible to verify quantities of suspect PCB containing ballasts scheduled for removal.

1.05 SUBMITTALS PRIOR TO START OF WORK

A. The reviews by the Owner or Owner's designated representative are intended to be only for general conformance with the requirements. The Owner or the Owner's designated representative assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.

B. The following items shall be submitted to, and approved by, the Owner or Owner's designated representative before commencing work involving the PCB abatement.

1. Provide a detailed work plan for PCB abatement and disposal that follows Attachment A – PCB Work Plan Outline.

2. Provide a site safety plan for PCB abatement prior to project initiation. The site safety plan shall deal with, at a minimum: Personal protective equipment; Site safety and health hazards; PCB Spills; Medical emergency; materials handling procedures; Contractor's internal administrative and inspection procedures; Earthquakes and/or fire emergency procedures; Protocol for responding to
complaints or questions from interested parties; 24-Hour emergency telephone numbers for Company Officers with authority to respond to emergencies.

3. The Contractor performing the work shall develop together with applicable subcontractors, a contingency plan covering accidental spills and work exposure to PCBs. The plan shall be submitted to the Owner or Owner's designated representative prior to commencing PCB-related work. The submittal shall also include a separate section to describe the hauler's spill contingency plan and avoidance procedures.

4. Workers: Demonstrate education and specialized training

5. Licenses: Submit copies of state and local licenses, evidence of Cal-OSHA registration and permits necessary to carry out the work of this contract.

6. Respiratory Protection Program (RRP) in compliance with Title 8 CCR 5144.

7. Proof of Respirator Fit Testing: Provide proof of respirator fit testing. Fit testing records must be less than eleven (11) months old and document testing on the type of respiratory protective equipment used for this project.

8. Material Safety Data Sheets/Specification Sheets: The Contractor shall submit Material Safety Data and Specification Sheets for all chemicals, encapsulants, etc. to be used for this project.

9. Rental Equipment: When rental equipment is to be used in the abatement areas or to transport hazardous waste, the Contractor shall provide written notification regarding intended use of the rental equipment to the rental agency before use, with copies to the Owner or Owner's designated representative.

Submittals at the Completion of the Project

A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the Owner's representative prior to acceptance of final pay request and shall include the following:

1. Copies of the Security and Safety Logs showing names of persons entering the work areas. The logs shall include date and time of entry and exit, supervisor's record of any accident (detailed description of accident).

2. Emergency evacuations and any other safety or health incident.


4. Project Summary including, but not limited to, the following: type, location, and approximate quantity of PCB ballasts removed, hazardous waste hauler certifications, name of disposal facility, waste disposal/recycling facility certification and/or receipt of disposal or destruction, dates of commence and completion of on-site work.
PART 2 - PRODUCTS

2.01 SIGNS AND LABELS:
   A. Warning signs for work areas shall be approximately 18 inches square with yellow background and 1 inch black letters. Signs shall read "DANGER - KEEP OUT - PCB HAZARD WORK AREA".
   B. Location of Caution Signs and Labels: Provide bilingual caution signs at all approaches to work areas in languages used by the Contractor's employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area.

2.02 PLASTIC SHEETING:
   A. Use fire-retardant (FR) polyethylene (poly) film manufactured by PolyAmerica, Grand Prairie, Texas 75051, or equal.
      1. Thickness - 6-mil, minimum, NO EXCEPTIONS.
      2. Flame Resistance/Flame Spread Rate <25.
      3. Conforms to NFPA #701 and Tested in accordance with ASTM E-84.
      4. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

2.03 VACUUM EQUIPMENT:
   A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site DOP testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing.
   B. All filter media must be disposed as PCB-contaminated waste at the end of filter life or conclusion of the PCB remediation work at the site.

2.04 LOCAL EXHAUST SYSTEM: VACUUM EQUIPMENT:
   A. Sufficient High Efficiency Particulate Absolute (HEPA) ventilation units shall be used to maintain negative pressure in each work area at 0.02 inches of water column and a minimum of four (4) air changes per hour for all dust producing work.
   B. Contractor shall provide onsite independent DOP testing to document the effectiveness of the air filtration units. The test results shall be signed by the individual performing the testing. Provide documentation to the District or District's designated representative.
   C. All filter media must be disposed as PCB-contaminated waste at the end of filter life or conclusion of the PCB remediation work at the site.

2.05 OTHER TOOLS AND EQUIPMENT:
   A. The Contractor shall provide other suitable tools for the removal and disposal activities.
   B. All PCB fluids, PCB-contaminated fluids, including flush and cleaning solvents and mixtures, shall be stored in sealed DOT 17E closed top drums or other waste container approved for storage of these materials.
C. All PCB solid wastes and items including disposable items used in the course of the work such as rags, absorbents, protective clothing, etc., shall be stored in sealed DOT 17C open type drums or other waste container approved for storage of these materials.

D. Any PCB Article Container, other than approved DOT drums, specified in this specification, intended for storage, shall be submitted to the Owner or Owner's designated representative for approval.

E. If ballast fluids are present on fixture or in ballast try use an appropriate solvent in which PCBs are shown to be at least 5-percent soluble by weight. Solvents specified by the U.S. EPA include kerosene, diesel fuel, terpene hydrocarbons and mixtures of terpene hydrocarbons and terpene alcohols. Care should be taken to limit the complexity of the waste stream. In all cases where solvents are used in the course of work, proper ventilation shall be provided by the Contractor to insure that resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems. The manufacturer's recommendations for application and requirements of Cal-OSHA shall be strictly observed.

F. Use an appropriate cleaning agent in which PCBs are shown to be at least 5-percent soluble by weight for removal of ballast fluids. Care should be taken to limit the complexity of the waste stream. Numerous, non-toxic, cleaning agents shown to meet or exceed the solubility requirement above are commercially available. In all cases where cleaners are used in the course of work, proper ventilation shall be provided by the Contractor to insure that resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems. The manufacturer's recommendations for application and requirements of Cal-OSHA shall be strictly observed.

G. Absorbents: "Safestep" as manufactured by Andesite of California, Inc., or approved equal for cleanup or packaging of leaking ballasts.

PART 3 - EXECUTION

3.01 SAFETY PROCEDURES AND WORKER PROTECTION

A. Take all precautions and measures required to protect employees, inspection personnel, Owner's on-site personnel and the general public from exposure to PCB solids, liquids and vapors.

1. All personnel authorized for entry in work areas shall be instructed in the proper procedures for working with or around electrical hazards and PCB containing/contaminated materials.

2. All electrical equipment upon which PCB related activities are to be performed shall be de-energized, locked out/tagged out and permanently disconnected from any power source prior to the commencement of the work.

3. Consumption of food or tobacco products shall not be permitted in any of the project work areas where PCBs, volatile solvents and/or other hazardous materials are present. Additionally, no open flames will be permitted in these same areas. Signage to this effect shall be provided for each work area.

4. The Contractor performing the work of this Contract shall develop, together with applicable subcontractors, a contingency plan covering accidental spills and work exposure to PCBs. The plan shall be submitted to the Owner or Owner's designated representative prior to commencing PCB-related work. The submittal shall also include a separate section to describe the hauler's spill contingency plan and avoidance procedures.
B. Work Area Protection and Marking: Prior to commencing any PCB-related work activities provide barricades and warning signs to clearly identify and effectively guard against unauthorized entry into the work areas. The Owner or Owner's designated representative will inspect and approve all work area preparation. The Contractor shall be responsible for all costs associated with the clean-up and testing resulting from contamination beyond established work areas.

1. Place barricades to maintain a minimum of 25 feet from all perimeters of the work being conducted to the barricades, where feasible.

2. All equipment such as tools, containers, etc., shall be confined to the work area until work is complete, containers are sealed and equipment properly decontaminated and safely stored for transport.

3. Secure a 6-mil poly drop sheet under each fixture prior to removal of ballast tray to prevent the spread of any ballast fluids from damaged or overheated ballast on to building surfaces.

C. Protective Clothing and Equipment: At all times when suspect PCB fluids or mixtures in any volume are not sealed in drums, containers or electrical equipment, workers shall wear:

1. Gloves impermeable to both PCBs and the solvent and/or clean up agent in use.

2. Disposable, full body suit, impermeable to both PCBs and the solvent and/or clean up agent in use for removal and cleanup of leaking ballasts.

3. Appropriate eye protection to insure that eyes are protected from liquid splatter or exposure to concentrated vapors or fumes.

4. Respiratory protection appropriate for the concentration of the hazardous material(s) and atmosphere present. Establish a respiratory protection program as outlined and required by Cal/OSHA. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).

D. Personnel Protection and Procedures: The PCB work area shall at no time be left unattended from the commencement of remediation work and until all PCBs and incidentals have been sealed in approved containers. If immediate transportation to the PCB storage facility or disposal facility is not feasible the work area must be secured in a manner approved by the Owner or Owner's designated representative.

1. During work procedures and at all times when PCB containing/contaminated fluids in any volume are not sealed in drums, containers, or electrical equipment all personnel entering the regulated work area must don protective clothing and equipment. Upon exiting the work area, all disposable protective clothing shall be placed in appropriate waste storage drums and sealed, for subsequent transportation to the on-site storage facility or disposal facility.

2. Workers with cuts or scratches shall seal these wounds sufficiently to prevent accidental contact of the hazardous materials within the regulated work area prior to entering the regulated work area. Similarly, workers who accidentally incur minor cuts or scratches in the course of work activities shall immediately leave the work area, cleanse the wound with medical grade soap and seal the wound before returning to the work area.
3.02 PERSONNEL PROTECTION

A. Informed Workers:
   1. All workers shall be informed of the hazards of PCBs and any other hazardous materials exposure. Workers shall also be instructed in the use and fitting of respirators, protective clothing (blue in color), decontamination procedures, and all other aspects associated with the abatement work.

B. Personal Hygiene Practices:
   1. The Contractor shall enforce and follow good personal hygiene practices during the abatement of hazardous materials. These practices will include but not be limited to the following:
      a. No eating, drinking, smoking or applying cosmetics in the work area. The Contractor shall provide a clean space, separated from the work area, for these activities.
      b. If data gathered by the Owner or Owner’s designated representative in areas adjacent to the work areas shows exposure to PCBs or other hazardous materials exceeding Cal-OSHA criteria, that area will become regulated and workers must wear protective clothing and approved respirators and must have a shower facility provided to them.

3.03 PCB REMOVAL

A. The Contractor shall remove all suspect-PCB containing ballasts associated with lighting equipment that will not be reinstalled.

3.04 CLEARANCE INSPECTIONS

A. Initial Visual Inspection: Contractor shall notify the Owner or Owner’s designated representative when the decontamination process in each containment area is complete. Evidence of dust or debris will require additional clean up by the Contractor. Contractor shall be responsible for re-cleaning all areas found to be deficient.

B. If the District or District’s designated representative determines that the work area is sufficiently clean, the Contractor may proceed. If the Owner or Owner’s designated representative determines that certain areas require additional cleaning, the Contractor shall re-clean the work area and request a second inspection of the re-cleaned area. All costs incurred by the Owner for inspections required after the second inspection will be charged to the Contractor.

3.05 HAZARDOUS MATERIALS DISPOSAL

A. It is the responsibility of the Contractor to coordinate waste handling, labeling, transportation, and disposal. The Contractor must comply fully with these Specifications, local, state, and federal regulations and provide documentation of the same.

B. Contractor shall provide at minimum three (3) day advance notification to the Owner when signatures are required on manifest(s). The Contractor shall ensure that the Hazardous Waste Manifest is correctly filled out. The Contractor shall give the appropriate copies to the Owner.

END OF SECTION
ATTACHMENT A
PCB WORK PLAN OUTLINE

In accordance with the contract documents, the Contractor is required to prepare a written, site-specific PCB Work Plan, and submit to the Owner for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the Owner's facilities and the environment.

I. Location of Work:
The work to be completed under this work plan will be completed at:
(Building name)
(Location within building)

II. Description of Work:
Describe the anticipated work scope

III. Schedule (days and hours of operations):
Phase/Task                      Anticipated Date(s)
Mobilization
Set-up of work area(s), containments
Abatement
Final Cleaning
Visual Inspection
Teardown
Demobilization

IV. Equipment and Materials
List all equipment and materials to be used, such as the following:

HEPA Vacuums                      Gloves
Hand tools                        Cleaning Agents
Solvents                         Respiratory Protection
Absorbents                       Disposable coveralls
Eye & foot protection

V. Crew
List all workers and supervisors with emergency contact names and phone numbers.

Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure/contamination controls, and engineering controls.
VII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

VIII. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of solid waste and wastewater.

IX. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

X. Containment Diagram

Include a diagram (hand written is acceptable) of the containment(s) showing the containment perimeter in relation to the surrounding areas and decontamination areas.

XI. Waste

Describe how all waste on this project will be packaged, labeled, stored, transported, manifested and dispose. Provide name of transportation vendor and disposal vendor, location of disposal vendor if not specified by the owner.

XII. Preparation of PCB Work Plan

Date Prepared and Prepared By (signature, name and title)
SECTION 02085

UNIVERSAL WASTE ABATEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions and Division I General Requirements shall be included in and made part of this Section.

B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.2 COMPLIANCE AND INTENT

A. This Section specifies requirements for removal of Universal Waste (UW) materials. The Contractor shall coordinate all abatement work with the specifications. During all work, provide monitoring and worker protective equipment in accord with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this section and all other sections of the Specifications. Where there is conflict, the most stringent requirement shall apply.

B. The work covered by this specification includes the removal of UW including, but not limited to fluorescent light tubes and high intensity discharge (HID) bulbs.

C. All work shall comply with Environmental Protection Agency (EPA) rules and regulations governing UW: 40 CFR 273, as published in the most recent edition of the Federal Register. Additionally, all work and work related practices shall comply with applicable Federal, State and local rules and regulations including, but not limited to, the California Department of Industrial Relations, California Code of Regulations (CCR) Title 8, Division 1, Chapter 4; Department of Health Services, CCR Title 22, Division 4.5 and California Health and Safety Code, Division 20. Where conflicts occur, compliance shall be based upon the most stringent requirements.

D. Workers involved in the removal of UW shall have received specific training on the hazards, appropriate personal protection and decontamination procedures associated with UW.

E. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for UW abatement in accordance with this specification.

F. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to UW abatement, handling, and the subsequent cleaning of contaminated areas.

G. Perform appropriate waste profile testing for all potential hazardous UW waste as required by this specification, the regulations, and the selected disposal/recycling facility. All testing shall be done in the presence of the District or District's
Environmental Consultant. Chain-of-custody forms shall be provided to the District within one (1) day following sample delivery to the laboratory.

H. During removal activities, the Contractor shall protect against contamination of soil, water, plant life, and adjacent building areas, and shall ensure that there is no release of hazardous materials.

I. It is the Contractor's responsibility to determine the quantities of UW impacted by the planned demolition work. The Contractor shall conduct a site visit to determine exact locations of materials.

J. UW removed during the abatement activities shall be handled, transported and disposed/recycled in an approved manner complying with all applicable federal, state, and local regulations.

1.3 DEFINITIONS

A. Certificate of Disposal: The document provided to the generator certifying that the UW wastes were disposed/recycled in strict accordance with all applicable Federal, State and Local regulations.

B. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample/samples from the moment it is collected, transported, analyzed, and ultimately stored in an archive.

C. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.

D. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.

E. DOP: Diocetylphthalate, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.

F. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.

G. District: Contra Costa Community College District

H. District's Environmental Consultant: Environmental Consulting firm and its representatives retained to provide compliance oversight and monitoring for the Contractor's universal waste abatement work activities.

I. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.
J. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.

K. Manifest: The document authorized by both Federal and State authorities for tracking the movement of hazardous wastes.

L. Powered Air Purifying Respirator (PAPR): A full facepiece respirator that has the breathing air powered to the wearer after it has been purified through a filter.

M. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

N. Returned Bill of Lading: An original duplicate copy of the bill of lading provided to the waste generator within forty-five (45) days of the transport date which acknowledges the receipt of the material at the disposal facility.

O. Universal Waste: This waste has three categories: CRTs, thermostats, batteries and lamps (fluorescent tubes, discharge lamps, mercury vapor lamps, batteries (not auto), and mercury thermostats.

P. Visual Inspection: A visual inspection by Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible material, debris, and dust.

1.4 UNIVERSAL WASTE MATERIALS

A. The following Universal Waste must be removed and disposed as required by other sections: Fluorescent light tubes and HID bulbs that will not be reinstalled following the seismic improvement project.

1.5 SUBMITTALS PRIOR TO START OF WORK

A. The reviews by the District or District's Environmental Consultant are intended to be only for general conformance with the requirements. The District or District’s Environmental Consultant assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.

B. The following items shall be submitted to, and approved by, the District or District's Environmental Consultant before commencing work involving the UW abatement.

1. Provide a detailed work plan for UW that follows Attachment A – Universal Waste Work Plan Outline.

2. Provide a site safety plan for UW abatement prior to project initiation. The site safety plan shall deal with, at a minimum: personal protective equipment; site safety and health hazards; UW spills; control of water leakage or discharge within and/or from the work area; medical emergency; materials handling procedures; contractor's internal administrative and inspection procedures; earthquakes and/or fire emergency procedures; protocol for responding to
complaints or questions from interested parties; 24-hour emergency telephone numbers for company officers with authority to respond to emergencies.

3. Workers: Demonstrate education and specialized training

4. Licenses: Submit copies of state and local licenses, evidence of Cal-OSHA registration and permits necessary to carry out the work of this contract.

5. Material Safety Data Sheets/Specification Sheets: The Contractor shall submit Material Safety Data and Specification Sheets for all materials and equipment to be used for this project.

6. Rental Equipment: When rental equipment is to be used in the abatement areas or to transport hazardous waste, the Contractor shall provide written notification regarding intended use of the rental equipment to the rental agency before use, with copies to the District or District’s Environmental Consultant.

1.6 SUBMITTALS AT THE COMPLETION OF THE PROJECT

A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the District or District’s Environmental Consultant prior to acceptance of final pay request and shall include the following:

1. Copies of the Security and Safety Logs showing names of persons entering the work areas. The logs shall include date and time of entry and exit, supervisor’s record of any accident (detailed description of accident).

2. Emergency evacuations and any other safety or health incident.


4. Project Summary including, but not limited to, the following: location and approximate quantity of UW removed, hazardous waste hauler certifications, waste disposal/recycling facilities, dates of commence and completion of on-site work.

PART 2 - PRODUCTS

2.1 SIGNS:

A. Warning signs for work areas shall be approximately 18 inches square with yellow background and 1 inch black letters. Signs shall read “DANGER - KEEP OUT - TOXIC CHEMICAL WORK AREA”.

B. Location of Signs: Provide bilingual Signs at all approaches to work areas in languages used by the Contractor’s employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area.

2.2 PLASTIC SHEETING:

A. Use fire-retardant (FR) polyethylene (poly) film.

1. Thickness - 6-mil, minimum, NO EXCEPTIONS.

2. Flame Resistance/Flame Spread Rate <25.
3. Conforms to NFPA #701 and Tested in accordance with ASTM E-84.
4. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

2.3 VACUUM EQUIPMENT:

A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the vacuum units. Vacuums shall not be used for any mercury spill cleanup.

2.4 MATERIALS AND EQUIPMENT:

A. Storage Containers:

1. All UW fluids, UW-contaminated fluids, including flush and cleaning solvents and mixtures, shall be stored in sealed DOT 17E closed top drums or other waste container approved for storage of these materials.

2. All UW solid wastes and items including disposable items used in the course of the work such as rags, absorbents, protective clothing, etc., shall be stored in sealed DOT 17C open type drums or other waste container approved for storage of these materials.

3. Any UW Article Container, other than approved DOT drums, specified in this specification, intended for storage, shall be submitted to the District or District’s Environmental Consultant for approval.

B. Solvents, Cleaning Agents and Absorbents:

1. Solvents: An appropriate solvent in which UWs are shown to be soluble in. Care should be taken to limit the complexity of the waste stream. In all cases where solvents are used in the course of work, proper ventilation shall be provided by the Contractor to insure that resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems. The manufacturer’s recommendations for application and requirements of Cal-OSHA shall be strictly observed.

2. Cleaning Agents: An appropriate cleaning agent in which UWs are shown to be soluble in. Care should be taken to limit the complexity of the waste stream. Numerous, non-toxic, cleaning agents shown to meet or exceed the solubility requirement above are commercially available. In all cases where cleaners are used in the course of work, proper ventilation shall be provided by the Contractor to insure that resulting fumes/vapors are not dispersed to occupied building areas either as a result of natural convection or via air intakes for building ventilation systems. The manufacturer’s recommendations for application and requirements of Cal-OSHA shall be strictly observed.

3. Absorbents: “Safestep” as manufactured by Andesite of California, Inc., or approved equal.
PART 3 - EXECUTION

3.1 SAFETY PROCEDURES AND WORKER PROTECTION

A. Take all precautions and measures required to protect employees, inspection personnel, District's on-site personnel and the general public from exposure to UW solids, liquids and vapors.

1. All personnel authorized for entry in work areas shall be instructed in the proper procedures for working with or around electrical hazards and UW containing/contaminated materials.

2. All electrical equipment upon which UW related activities are to be performed shall be de-energized, locked out/tagged out and permanently disconnected from any power source prior to the commencement of the work.

3. Consumption of food or tobacco products shall not be permitted in any of the project work areas where UWs, volatile solvents and/or other hazardous materials are present. Additionally, no open flames will be permitted in these same areas. Signage to this effect shall be provided for each work area.

4. The Contractor performing the work of this Contract shall develop, together with applicable subcontractors, a contingency plan covering accidental UW spills and work exposure to UVs. The plan shall be submitted to the District or District's Environmental Consultant prior to commencing UW-related work. The submittal shall also include a separate section to describe the hauler's spill contingency plan and avoidance procedures.

B. Work Area Protection and Marking: Prior to commencing any UW-related work activities provide barricades and warning signs to clearly identify and effectively guard against unauthorized entry into the work areas.

1. Place barricades to maintain a minimum of 25 feet from all perimeters of the work being conducted to the barricades, where feasible.

2. All equipment such as tools, containers, etc., shall be confined to the work area until work is complete, containers are sealed and equipment properly decontaminated and safely stored for transport.

3. Place 6 mil poly drop sheeting directly below fixtures scheduled for bulb or tube removal. Drop poly shall be large enough to capture debris from possible breakage.

C. Protective Clothing and Equipment: At all times when UW fluids or mixtures in any volume are not sealed in drums, containers or electrical equipment, workers shall wear:

1. Gloves impermeable to both UWs and the solvent and/or clean up agent in use.

2. Disposable, full body suit, impermeable to both UWs and the solvent and/or clean up agent in use.

3. Appropriate eye protection to insure that eyes are protected from liquid splatter or exposure to concentrated vapors or fumes.

4. Respiratory protection shall be used for any mercury cleanup that has not been previously assessed.
a. The Contractor shall provide protective clothing, eye protection, and breathing apparatus as required for authorized inspection personnel upon request.

b. Cleanup of broken mercury containing products (mercury vapor producing materials): NIOSH-approved, half-face respirators with double stack Organic Vapor/HEPA cartridges.

D. Personnel Protection and Procedures: The UW work area shall at no time be left unattended from the commencement of remediation work and until all UWs and incidentals have been sealed in approved containers. If immediate transportation to the UW storage facility or disposal facility is not feasible the work area must be secured in a manner approved by the District or District's Environmental Consultant.

1. During work procedures and at all times when UW containing/contaminated fluids in any volume are not sealed in drums, containers or electrical equipment, all personnel entering the regulated work area must don protective clothing and equipment. Upon exiting the work area, all disposable protective clothing shall be placed in appropriate waste storage drums and sealed, for subsequent transportation to the on-site storage facility or disposal facility.

2. Workers with cuts or scratches shall seal these wounds sufficiently to prevent accidental contact of the hazardous materials within the regulated work area prior to entering the regulated work area. Similarly, workers who accidentally incur minor cuts or scratches in the course of work activities shall immediately leave the work area, cleanse the wound with medical grade soap and seal the wound before returning to the work area.

3.2 SPILL CLEAN-UP, CONTAINERIZATION AND MARKING

A. Clean-up of Work Area, UW Articles and Spills:

1. Equipment and Tools: After the last UW has been removed and all fluids and solids cleared from fixture, all tools and equipment used in the work shall be decontaminated and properly stored for reuse. All tools that may have come in contact with UW at any concentration shall be thoroughly double washed/rinsed with an appropriate cleaning agent, wiped clean and properly stored.

2. UW Contaminated Articles: All exterior surfaces of equipment that may have come in contact with UW or contaminated solids or fluids either during the course of work activities or due to past leaks shall be double washed/rinsed, at a minimum, with an appropriate cleaning agent and wiped clean.

3. Solid Impenetrable Surfaces: All metal surfaces and surfaces with impervious liners which have come in contact with UW or UW mixtures in the course of the work or as a result of past leaks shall be thoroughly cleaned using a combination of absorbents and solvents or cleaning agents. Minimum cleaning requirements for these surfaces include removal of bulk material and two rinses with the cleaning agent of the surfaces, which come in contact with UW or UW mixtures in the course of the work or as a result of past leaks. The work area shall be effectively ventilated during operations such that vapors used in decontamination and cleaning are not vented to occupied building areas. Upon completion of UW-related activities, if fumes or vapors are still present in levels,
which could impede breathing or be considered toxic under State and/or NIOSH standards, the Contactor shall provide additional ventilation to accelerate drying. Auxiliary breathing apparatus may only be used by personnel trained in the use of this equipment and experienced in conducting electrical work while wearing equipment, which could impede safe work practices.

4. Soils and Porous Materials: The U.S. EPA, Region IX, regards soil, asphalt, wood, cement and concrete as porous materials that absorb UW. Where practicable, these materials must be removed when they are within the spill or contamination boundary.

5. Decontamination Verification: Completion of decontamination activities will be verified by the District or District's Environmental Consultant.

B. Containerization and Marking:

1. All liquid generated as a result of work activities and clean up operations shall be placed in appropriate waste containers and the containers sealed.

2. All solids such as absorbents, rags, disposable protective clothing, soils, and other incidentals shall be placed in appropriate waste containers and the containers sealed.

3. All drums shall be permanently marked as to specific contents and dated. In addition, each drum (and container) shall be marked with appropriate EPA, UW label(s) that comply with Federal and State Regulations.

3.3 HANDLING AND TRANSPORTATION TO STORAGE FACILITIES

A. Drums: All closed and open top drums must be permanently sealed, marked and labeled prior to loading on transport vehicle. Filled drums shall be loaded on the transport vehicle by any of the following methods.

1. Hoist or lift truck utilizing a two-point drum lifter
2. Hoist or lift truck provided with a band-around type drum lifter
3. Lift truck lifting the drums from underneath by a pallet attached to the drum by a banding arrangement.

B. Drums shall not be lifted by the following methods.

1. Any rope, chain or cloth slings tied about the drum.
2. Placement of drums on bare lift truck forks.
3. Forcing drums between forks of a lift truck.
4. Any commercial drum lifters exerting force of the sides of a drum.

C. All drums or article containers shall be secured to the transport vehicle to prevent movement in transport.

3.4 TRANSPORTATION TO DISPOSAL FACILITY

A. General: All UW Articles removed and all drums containing liquids, solids and incidentals shall be transported to the off-site District approved recycling/disposal facility utilizing District approved haulers.
1. The Contractor performing the work of this section shall be licensed for the transportation and hauling of extremely hazardous wastes. The Contractor shall provide a route plan, which clearly identifies the routes proposed while transporting UW items from the work site to the off-site facilities.

2. A minimum of two operators shall be in attendance at all times when UW items are being transported, loaded and unloaded.

B. The rules in this section apply to each motor carrier engaged in the transportation of hazardous materials by a motor vehicle, which must be marked or placarded in accordance with DOT 177.

C. Every motor vehicle transporting or storing Articles and items containing UWs or hazardous materials must be operated in compliance with the laws, ordinances and regulations of the state jurisdiction of which it is being operated in, unless they are at variance with specific regulations of the Department of Transportation which are applicable to the operation of that vehicle which impose a more stringent obligation or restraint.

D. No person may smoke within 25 feet of any Contractor’s vehicles, which contains flammable materials (flushing solvents), or an empty tank motor vehicle, which has been used to transport flammable materials.

E. When a motor vehicle, which contains hazardous materials is being fueled its engine must not be operated.

F. Motor vehicles transporting UWs or hazardous materials must have all containers properly secured in place to insure that no equipment items or containers can be loose or unsafely placed into the transport vehicle. This may include chaining, roping or strapping and winching. The driver of the vehicle must stop the vehicle in a safe location at least once during each two hours or one hundred miles of travel whichever is less and inspect the contents of the shipment. At the time of inspection if any form of binding is found to be loose the driver shall immediately take action to remedy the situation for safe transportation.

G. Any equipment, drums or other Articles carried in an open, flatbed or stake type truck shall be covered with a tarp to protect it from the elements.

H. A motor carrier that transports hazardous waste must furnish the driver of each motor vehicle in which the waste is transported with the following documents.
   1. A copy of this specification section
   2. A document containing instructions on procedures to be followed in the event of accident or delay. The documents must include the names and telephone numbers of persons to be contacted, and the substances of the hazardous wastes being transported, and the precautions to be taken in emergencies such as fires, accident or leakages.
   3. Bill of Lading and permit documents described in this specification and required for waste transport.
I. A motor vehicle being operated must be marked if that vehicle is transporting UWs or hazardous materials of a kind that require the vehicle to be marked or placarded in accordance with DOT 177.

3.5 UW DISPOSAL

A. The Contractor shall treat and dispose of all collected UW wastes collected and generated during the execution of this Contract including Articles, fluids, etc. as set forth this specification.

B. Except as may be otherwise specifically directed by the District or District’s Environmental Consultant, the Contractor shall treat and dispose of the waste UW materials as governed by 40 CFR 273, California State regulations, local regulations and subsequent amendments.

1. By incineration or recycling at a facility approved for such use by the U.S. EPA, and all other controlling regulatory agencies and bodies of the state, county and municipality of that facility’s location all UW fluids, flushing fluids, and other UW contaminants. If preapproved by the District, waste contaminated solids may also be incinerated as suitable and allowed for this type of disposal.

C. All UW wastes generated as part of these operations will be disposed of by the Contractor in a legal manner.

D. The Contractor shall not sell, transfer or recover any material from the wastes received from the District without their prior written consent.

3.6 BILL OF LADING AND RECORDS

A. The Contractor shall provide the District or District’s Environmental Consultant with a certificate of disposal verifying that all waste received by it has been properly treated and disposed.

B. The Contractor shall provide the District or District’s Environmental Consultant copies of all Bill of Ladings, permits or other documents currently in effect relating to the specific UW wastes to be transported, treated and disposed hereunder except as otherwise stated in this Section. The Contractor shall also promptly furnish to the District or District’s Environmental Consultant copies of all new or renewal permits or other documents applicable to this agreement as soon as the Contractor receives same.

C. The Contractor shall furnish complete Bill of Ladings for all UW Articles to be collected from the facility at which the removal and decontamination occurred. The District or District’s Environmental Consultant shall sign the Bill of Ladings. These Bill of Ladings shall accompany the waste loads to disposal and be properly completed by the hauler and disposal agent as required by Federal and State hazardous waste management law. The final Bill of Lading shall then be returned by registered mail to the District or District’s Environmental Consultant within 30 days.

D. The contract work will not be considered complete nor will the District make final payment until the District or District’s Environmental Consultant receives certifications of incineration (for fluids) and/or recycling.
3.7 PLACEMENT IN STORAGE AND RECORDS

A. Drums and Articles shall be placed in the storage facility in locations as directed by the District or District's Environmental Consultant.
   1. Articles shall be placed such that ample clearance is provided around equipment to facilitate future inspection.
   2. Drums shall be placed on pallets of sufficient strength to withstand double stacking. Drums shall not be stacked at time of storage unless space is limited as determined by the District or District's Environmental Consultant. Where stacking of drums is necessary, pallets shall be placed between the drum layers.
   3. Immediately following unloading of the UW transport vehicle, the cargo area shall be inspected to check for fluid leaks. If any fluids are found, the source of the leaking drum or item shall be identified and sealed. The contamination cargo area shall be thoroughly double washed/rinsed clean with absorbents, solvents and liquid cleaner. Cleaning agents, solvents and solids shall be placed in proper drums for disposal.

B. Records: Upon completion of all UW work related activities the Contractor shall provide a complete record of such activities and storage data to the Safety Officer or other administrator responsible for UWs at the site. In addition, two copies of the record shall be transmitted to the District or District's Environmental Consultant. The record shall include the following data:
   1. Name of the firm performing the work of this Section and technician in charge.
   2. Drum sizes (30 or 55 gallon)
   3. Identification of contents (liquids, flushing solvent, cleaning solvents for solids, rags, absorbents, soil, etc.)
   4. Weight in kilograms and gallons of contents of each drum or container.
   5. Date placed in storage.

END OF SECTION 02085
ATTACHMENT A
UNIVERSAL WASTE WORK PLAN OUTLINE

In accordance with the contract documents, the Contractor is required to prepare a written, site-specific Universal Waste Work Plan, and submit to the District for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the District's facilities and the environment.

I. Location of Work:
The work to be completed under this work plan will be completed at:

(Building name)
(Location within building)

II. Description of Work:
Describe the anticipated work scope

III. Schedule:

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<tr>
<th>Phase/Task</th>
<th>Anticipated Date(s)</th>
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<td>Set-up of work area(s), containments</td>
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<td>Demobilization</td>
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IV. Equipment and Materials
List all equipment and materials to be used, such as the following:

HEPA Vacuums     Gloves
Hand tools        Manometers
Solvents         Cleaning Agents
Absorbents        Airless sprayers/compressors
Respiratory Protection Disposable coveralls
Eye & foot protection

V. Crew
List all workers and supervisors with emergency contact names and phone numbers.

Clearly identify the supervisor and competent person who has authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure contamination controls, and engineering controls.

VII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers which are anticipated for this project. Identify the phases of the project for which
respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

VIII. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of solid waste and wastewater.

IX. Air Monitoring Data

Identify general worker air monitoring protocols to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

X. Containment Diagram

Include a diagram (hand written is acceptable) of the containment(s) showing the containment perimeter in relation to the surrounding areas and decontamination areas.

XI. Waste

Describe how all waste on this project will be packaged, labeled, stored, transported, manifested and disposed.

XII. Preparation of Universal Waste Work Plan

Date Prepared and Prepared By (signature, name and title)
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BID DOCUMENTS COVER SHEET

CONTRACT DOCUMENTS

FOR

C-633 - SEISMIC RETROFIT, PROJECT 1

at

CONTRA COSTA COLLEGE

2600 Mission Bell Drive, San Pablo, CA. 94806

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

Consist of the following:

DSA File #7-C1
DSA Application #01-113799

Architect:
Noll & Tam Architects and Planners
729 Heinz Ave.
Berkeley, CA 94710

April 8, 2014

VOLUME II
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SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Remove all items within the limits of Work shown and specified on the Contract Drawings. Do not remove anything beyond the limits of Work shown without prior approval of the Architect, prior to proceeding. Refer to Construction Staging and Demolition Drawings.

1.2 REFERENCES

A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. California Code of Regulations. Title 24, 2010 edition, also known as California Building Code (CBC).

C. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to Work of this Section where cited by abbreviations noted below:

1. National Standards Institute, Inc.

1.3 QUALITY ASSURANCE

A. Protect existing structures, facilities, and plant life from damage. Items damaged as a result of demolition operations shall be repaired or replaced, as required, at no increase in Contract Price.

B. Perform Work so as to provide the least interference and most protection to existing facilities and improvements to remain. Provide Architect with 72-hour notice of commencement of operations.

C. No blasting will be permitted.

D. Protection:

1. Provide as necessary to protect public, the Owner’s employees, finishes and improvements to remain and adjoining property from damage, all in accordance with applicable regulations.
2. Refer to Division 1 for Temporary Controls, for Dust and Dirt Control.

E. Salvage Materials: Carefully remove, protect and deliver to Owner the following salvage materials: Door hardware, plumbing fixtures and trim, electrical light fixtures and equipment, as directed.

1.4 SUBMITTALS

A. Not applicable.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas affected by Work of this Section and verify the following:
   1. Disconnection of utilities as required.
   2. That utilities serving occupied portions of building will not be disturbed.
   3. Shoring is in place.
   4. Removal by Owner of the Owner’s personal property, movable furniture, and equipment items not designated for relocation has been completed.

B. Where existing conditions conflict with representations of the Contract Documents, notify the Architect and obtain written clarification before proceeding.

C. Do not commence until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out cutting Work at jobsite and coordinate with related Work for which cutting is required.

3.3 DEMOLITION

A. Perform Work in accordance with ANSI A10.6 unless otherwise specified.

B. Demolish concrete and steel in small sections. Do not permit material to fall on or in existing buildings.

C. Restrict all concrete and steel cutting, drilling, chipping, sawing, etc., to times which do not interfere with school functions. Perform Demolition Work only with authorization from Owner at mutually agreeable times. Notify Owner four (4) working days in advance. Comply with Division 1 for Noise Controls.
D. Perform demolition as much as possible with small tools.

E. Jackhammering:
   1. Jackhammering will be permitted only to limited degree, with prior approval of Architect.
   2. Prior to jackhammering, consult existing As-Built Drawings. Do not jackhammer within 2-inches of reinforcing or structural steel to remain; remove final 2-inches of material with chipping gun.

3.4 PATCHING

A. Repair or replace any surfaces which become exposed, defaced, or damaged as a result of Alterations or Demolition Work at no increase in Contract Price. Make all such repairs with materials equal in kind and quality to match existing adjacent surfaces. Where existing wall, partitions, or ceilings are removed, patch adjacent floor, wall, and ceiling surfaces to match existing, unless otherwise noted. Repaint patched surfaces to nearest change of plane.

3.5 REMOVALS

A. Remove from jobsite and legally dispose salvage and debris so as not to delay progress of related Work.

END OF SECTION
SECTION 03 10 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL

Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

Provide all labor, materials, equipment, services and transportation for formwork and related accessories required to complete all cast-in-place concrete work and the installation of embedded items as shown on Drawings, as specified herein, and as required by the job conditions.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- Submittals
- Quality Control
- Concrete Reinforcement and Embedded Assemblies
- Cast-in-Place Concrete

Section 03 20 00

1.4 CODES AND STANDARDS

A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.

B. Standards:

3. ACI 318 – Building Code Requirements for Reinforced Concrete.
4. ACI 347 – Guide to Formwork for Concrete.
C. Definitions:

1. The term “Contract Documents” in this specification is defined as the design drawings and the specifications.
2. The term “SER” in this specification is defined as the Structural Engineer of Record for the structure in its final condition.
3. The term “Design Professionals” in this specification is defined as the Owner’s Architect and SER.
4. The term “Contractor” in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.
5. The term “Owner Testing Agency” in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.
6. The terms “for record” and “submit for record” in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.
7. Working Days: Monday through Friday, excluding federal or state holidays.

1.5 QUALITY ASSURANCE

A. Design Criteria: Formwork shall conform to American Concrete Institute’s “Recommended Practice for Concrete Formwork” (ACI 347) and California Code of Regulations, Title 24, Part 2 (CBC) Section 1906A

1. Formwork:
   
a) Shall prevent leakage or washing out of cement mortar.
   b) Shall resist spread, shifting, and settling.
   c) Shall reproduce accurately required lines, grades, and surfaces within tolerances specified.

2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.

1.6 CONTRACTOR QUALIFICATIONS

A. The work of this section shall be performed by a company which specializes in the type of concrete formwork required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workers thoroughly experienced in the necessary crafts.

1. Work shall be performed in compliance with Owner’s insurance underwriters' requirements.

B. Contractor’s Testing Agency Services: Required as specified in Division 1, and herein.
C. Materials and installed work may require testing and retesting at anytime during progress of work, as directed by Design Professionals. Tests, including retesting of rejected materials for installed work will be done at Contractor’s expense.

1.7 SUBMITTALS

A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.

1. Submittal Schedule: See Section 03 30 00.
2. Formwork Shop Drawings:

   a) Submit for Record: Formwork shop drawings. Shop drawings shall clearly indicate but not be limited to the following:

      i. Size, type and quality of form materials including conditions at tops and ends of walls. (If wood is used, indicate species.)
      ii. Form construction indicating structural stability and jointing including special form joints or reveals required by Contract Documents
      iii. Location and pattern of form tie placement, and other items that affect the appearance of concrete that will remain exposed to view.
      iv. Form finish clearly indicating proper locations and full coordination with concrete finishes required by Contract Documents.

   b) Submit for Review

      i. Location of proposed construction joints in walls, floors, slabs, beams per specification Section 03 30 00.

3. Product Data - Submit copies of manufacturers' product data and installation instructions for proprietary materials used in exposed concrete work, including form liners, release agents, manufactured form systems, ties, and accessories.

4. Samples - At request of Architect, submit samples of form ties and spreaders

5. Compatibility Certification - Submit for record a written statement certifying that form release agent used is compatible with subsequent architectural finish materials applied to concrete surfaces. Submit along with manufacturer's data.

6. Asbestos and PCB Certification: Submit for record. After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in General Conditions.

7. Hazardous Materials Notification: Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
1.8 FORMWORK DESIGN

A. Design of Formwork, Shoring/Reshoring, and its removal is the Contractor's responsibility.

B. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads per SEI/ASCE 37-02 that might be applied, until such loads can be supported by the concrete structure.

C. Design Requirements:

1. Forms shall be designed for fabrication and erection in accordance with Design Professionals' requirements and recommendations of ACI 301, 318 and 347.
2. Design formwork in a manner such that the total construction load does not at any time exceed the total design load of new or existing construction and accounts for concrete age and relative strength at time of loading. See Section 3.2 for shoring/reshoring requirements.
3. Design formwork for loads and lateral pressures outlined in Section 2.2, ACI 347, and wind and seismic loads as specified by SEI/ASCE 37-02 unless otherwise controlled by local building code.
4. Design formwork to include loads imposed during construction, including weight of construction equipment, concrete mix, height of concrete drop, rate of filling of formwork, vibrator frequency, ambient temperature, foundation pressures, lateral stability, temporary imbalance or discontinuity of building components, and other factors pertinent to safety of structure during construction.

1.9 QUALITY ASSURANCE BY OWNER'S TESTING AGENCY

A. General: The Owner's Testing Agency shall inspect concrete formwork as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such a defect is discovered, nor shall it obligate Design Professionals for final acceptance.

B. Testing Agency shall provide qualified personnel at site to inspect formwork using the latest Contract Documents and approved shop drawings as follows:

1. Prior to placement of reinforcement, inspect formwork for grade, quality of material, absence of foreign matter, and other imperfections that might affect suitability of concrete placement and tolerances stated herein.
2. Inspect forms for location, configuration, compliance with specified tolerances, block outs, camber, shoring ties, seal of form joints and compliance with Contract Documents.
3. Verify condition of bond surfaces, locations and sizes of all accessories, embedment items, and anchorage for prevention of displacement.

4. Verify proper use/application of form release agents.

5. Inspect concrete surfaces immediately after removal of formwork and prior to any patching or repair work.

C. Submit inspection, observation, and/or test reports to the Design Professionals and provide an evaluation statement in each report stating whether or not concrete formwork conforms to the requirements of Specifications and Drawings. Specifically note deviations.

D. Immediately report deficiencies to the Contractor. Contractor shall correct the deficiency at no cost to the Owner.

1.10 DELIVERY, HANDLING, STORAGE

A. Comply with General Conditions and Division 1, including the following:

1. Store forms and form materials clear of ground and protect from damage.

2. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.11 JOB CONDITIONS

A. Sequencing Schedule:

1. Ensure timely delivery of embedded items. Be responsible for cutting and patching necessitated by failure to place embedded items.

2. Plan erection and removal to permit proper sequence of concrete placing without damage to concrete.

1.12 WARRANTY

A. Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:

1. Discoloration of concrete scheduled to remain exposed to view.

2. Damage of concrete finishes caused by forms.

3. Damage of concrete caused by form stripping.


5. Non-compatibility of form release agent with subsequent architectural finish materials applied to concrete surfaces.

6. Excessive and/or noticeable bowing in placed concrete members caused by deflection of formwork during concrete placement.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.

B. Substitutions: Comply with General Conditions using form in Division 1.

2.2 FORMWORK REQUIREMENTS

A. General Requirements:

1. Formwork shall meet construction safety regulations for locality in which this Project is located.
2. Forms shall be removable without impact, shock or damage to concrete surfaces, the structure and adjacent materials.
3. Forms shall be tight-fitting, designed and fabricated for required finishes and to withstand concrete weight and maintain tolerances as specified in ACI 117 for the following designations:
   a) Class A – For surfaces prominently exposed to public view where appearance is of special importance.
   b) Class B – Coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.
   c) Class C – General Standard for permanently exposed surfaces where other finishes are not specified.
   d) Class D - Minimum quality surface where roughness is not objectionable, usually applied where surfaces will be concealed.

4. Furnish forms in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings, using form materials with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

5. Butt Joints: Shall be solid and complete with backup material to prevent leakage of cement paste.

B. Form Finishes for Exposed Surfaces:

1. Type: Straight, smooth, free of cement paste leaks at butt-joints, surface imperfections and other irregularities detrimental to appearance of finished concrete, fully coordinated with requirements for required finish material.

2. Form exposed areas of columns, beams, ledges, balcony fascias to achieve true alignment and level soffit of spandrel beams and concrete edges. All such areas must be sharp, straight and true to line and level. Spandrel beams and concrete canopies and ledges must have adequate shoring to prevent any visible amount of sag and sufficient bracing to prevent any lateral movement during construction.
2.3 FORM MATERIALS

A. General: Plywood, fiberglass, metal, metal-framed plywood faced, or other acceptable panel-type materials.
   1. Provide materials with sufficient strength to prevent warping.

B. Plywood: Of species and grade suitable for intended use, sound undamaged sheets with clean true edges.
   2. Board Forms: Shiplap or tongue and groove lined with PS 1 grade Plyform Class I and II Exterior ½-inch or APA HDO Exterior ½-inch or 3/16-inch thick fiberboard, Class I or II as per strength requirements.

C. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

D. Lumber: Construction grade or better Douglas Fir without loose knots for other defects.
   1. Use only where entire width can be covered with one board 11-1/4" or less in width.

E. Forms for Cylindrical Columns and Supports: Metal, glass-fiber reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications.
   1. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
   2. Columns Forms: SONOTUBE or equal product substituted per Section 01 25 00, and as required for other configurations

F. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to support weight of placed concrete without deformation.
   1. Pan Joist forms: Provide removable forms, Ceco Corporation or equal. Forms shall have adequate strength to maintain their shape during placing of concrete and shall permit easy removal without damage to concrete surfaces. Forms shall be true to shape, free from bulges, tears or other damage, and shall be free from oil, grease, paint, dirt or other deleterious coatings. Forms shall fit close, tight and straight. Forms shall be cleaned up before reuse.
G. Chamfer for Form Corners:

1. Types: Chamfer strips of wood, metal, PVC or rubber fabricated to produce 
   smooth form lines and tight edge joints, 3/4" size, maximum possible lengths.
2. Required for all exposed corners of beam, walls and column forms.

H. Form Ties:

1. Type: Factory-fabricated metal, adjustable length, designed to prevent form 
   deflection and to prevent spalling concrete upon removal.
2. Ties used for architecturally exposed concrete shall be galvanized.
3. Ties shall not leave metal closer than 1-1/2" to exposed surface.
4. When removed, ties shall not leave holes larger than 1" diameter in concrete 
   surface. Ties shall not leave fractures, spalls, depressions, or other surface 
   disfigurements greater than 1/8-inch.
5. Removable Ties: Use type with tapered cones, 1" outside diameter, for 
   concrete walls which will remain exposed to view and scheduled for 
   architectural finishes.
6. Snap-Off Ties: Use for concrete walls below grade and walls which will not 
   remain exposed to view and are not scheduled for architectural finishes.
7. Wire Ties: Not acceptable.

I. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:

1. Type: Of size, strength and quality to meet the required quality of formwork.

J. Expansion Joint Filler:

1. Fiber Type: Premolded asphalt-impregnated fiber, ASTM D1751, 1/4-inch thick 
   unless otherwise noted. Same as W. R. Meadows, Inc.'s “Sealtight Fiber 
   Expansion Joint”; Grace Construction Materials “Serviced Fiber Expansion Joint 
   Filler, Code 1390”; National Expansion Joint Co.'s “Fiber Joint Filler No. 12”; 
   Burke Concrete Accessories, Inc.'s “Burke Fiber Expansion Joint”; or equal 
   product substituted per Section 01 25 00.
2. Cork Type: Preformed cork, ASTM D1752, Type II, 1/4-inch size unless otherwise 
   noted. Same as W. R. Meadows, Inc.’s “Sealtight Cork Expansion Joint”; 
   Sonneborn-Contech’s “Sonoflex Cork”; Grace Construction Materials’ “Serviced 
   Standard Cork Expansion Joint Filler, Code 4323; or equal product substituted 
   per Section 01 25 00.

K. Form Release Agent:

1. Type: Commercial formulation form release agent of non-emulsifiable type 
   which will not bond with, stain, or adversely affect concrete surfaces. Form 
   release agent shall not impair subsequent treatment of concrete surfaces 
   requiring bond or adhesion, or impede the wetting of surfaces to be cured with 
   water or curing compounds. Form release agent shall be compatible with 
   subsequent architectural finish materials applied to concrete surfaces. Apply in 
   compliance with manufacturers' instructions.
2. Form release agent shall meet, at a minimum, all federal requirements for volatile organic compounds (VOC's). Form release agent shall meet the requirements of CalGreen Section 5.504.4.3.

3. For Steel Forms: Non-staining rust-preventative type.

L. Reglets: Provide sheet metal reglets formed of same type and gauge as flashing metal, unless indicated otherwise on Drawings. Where resilient or elastomeric sheet flashing, or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet metal. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

M. Coordinate with materials as specified in Section 03 20 00: Concrete Reinforcement and Embedded Assemblies.

2.4 SOURCE QUALITY CONTROL

A. Plywood shall bear American Plywood Association's "Guide to Plywood Grades" (APA) grade-trademark.

PART 3 - EXECUTION

3.1 FORMWORK

A. General:

1. Inspect areas to receive formwork.
   a) Immediately report to Owner's Testing Agency and Design Professionals in writing the conditions that will adversely affect the Work.
   b) Verify that excavations are sufficient to permit placement, inspection and removal of forms.
   c) Verify that excavations for earth forms have been neatly and accurately cut.
   d) Verify that conditions are otherwise propoer for formwork construction.

2. Do not start work until unsatisfactory conditions have been corrected.

3. Construct forms to sizes, shapes, lines, and dimensions shown on Contract Documents, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.

4. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins, and to maintain alignment.

5. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, drips, bevels, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in the Work.


7. Maintain formwork and finished work construction tolerances complying with ACI 301, 117, and 347.
8. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.

9. Erect forms for easy removal without hammering or prying against concrete surfaces.

10. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.

11. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.


13. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce smooth lines and tight edge joints.

14. Design, erect, support, brace and maintain formwork and shoring to support loads until such loads can be safely supported by the concrete structure.

15. Where specifically shown on the Contract Documents as monolithic, upturned beams, curbs and similar members in connection with slabs shall be formed so that they can be poured integrally with slabs.

B. Walls and Other Formed Elements:

1. Erect outside forms for exposed exterior walls first and obtain the Architect's approval before reinforcement is placed. Obtain Architect's approval of the reinforcement before interior form is erected.

2. Carefully align inside and outside forms before tightening ties.

3. Plywood Forms: Insure vertical joints are plumb and horizontal joints are level; arrange joints and ties in geometrical pattern as approved by the Architect.

4. Form inside corners at exposed conditions with mitered boards or plywood so that no concrete is placed against form ends.

5. After erection, seal all cracks, holes, slits, gaps, and apertures in forms so that they will withstand the pressure and will remain completely watertight.

6. Provide a means to seal the bottom of forms at construction joints such as foam tape or other gasket devices.

7. Apply a coating of release agent prior to the erection of formwork. Follow approved manufacturer’s recommendations.

C. Formwork Loads on Grade

1. Where loads from formwork bear on grade, provide suitable load-spreading devices for adequate support and to minimize settlement. In no event shall frozen ground or soft ground be utilized directly as the supporting medium.

D. Earth Forms:

1. Construct wood edge strips at top sides of excavations.

2. Provide forms for footings wherever concrete cannot be placed against solid earth excavation.

3. Remove loose dirt and debris prior to concrete pours.
4. Foundation concrete may be placed directly into neat excavations provided the
foundation trench walls are stable as determined by the Architect (Structural
Engineer), subject to the approval of DSA.

a) The horizontal dimensions of unformed concrete footings shall be
increased 1 inch at every surface at which concrete is placed directly
against the soil.

b) The minimum formwork shown on the drawings is mandatory to ensure
clean excavations immediately prior to and during the placing of
concrete.

E. Footings and Grade Beams:

1. Provide forms for footings and grade beams if soil or other conditions are such
that earth trench forms are unsuitable.

F. Slab Forms:

1. Establish levels and set screeds.
2. Depress slabs where required to receive special floor finishes.

G. For slabs-on-grade, secure edge forms in such a manner as to not move under weight of
construction loads, construction and finishing equipment, or workers

H. Concrete Accessories and Embedded Items:

1. Obtain necessary information for coordination of formwork with items to be
embedded in concrete and other relate work.
2. Install into forms concrete accessories, sleeves, inserts, anchor bolts, anchorage
devices and other miscellaneous embedded items furnished by other trades or
that are required for other work that is attached to or supported by cast-in-
place concrete.

a) Use setting drawings, diagrams, instructions and directions provided by
suppliers of items to be attached.

3. Install reglets to receive top edge of foundation sheet waterproofing and to
receive through-wall flashings in outer face of concrete frame at exterior walls,
where flashing is shown at lintels, relieving angles, and other conditions.
4. Install dovetail anchor slots in concrete structures as indicated on drawings or
required by other trades.
5. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for
slabs to achieve required elevations and contours in finished surfaces.
6. Coordinate with Section 03 20 00 Concrete Reinforcement and Embedded
Assemblies.
7. Install accessories and embedded items straight, level, plumb and secure in
place to prevent displacement by concrete placement.
8. Use templates to ensure accurate placement of anchor bolts, inserts, and other
embedded items.
I. Temporary Openings:

1. Locate temporary openings in forms at inconspicuous locations.
2. For clean-outs and inspection before concrete placement, locate temporary openings where interior area of formwork would otherwise be inaccessible.
3. For cleaning and inspections, locate openings at bottom of forms to allow flushing water to drain.
4. Securely brace temporary openings and set tightly in forms to prevent loss of concrete.
5. Close temporary openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be noticeable on exposed concrete surfaces.

J. Provisions for Other Trades: Coordinate and provide openings in concrete formwork to accommodate work of other trades.

1. Determine size and location of openings, recesses, chases, offsets, openings, depressions, and curbs from information provided by trades requiring such items.
2. Accurately place and securely support items built into forms.

K. Cleaning:

1. Normal Conditions
   a) Thoroughly clean forms and adjacent surfaces to receive concrete.
   b) Remove chips, wood, sawdust, dirt, standing water or other debris just before placing concrete.
   c) Flush with water or use compressed air to remove remaining foreign matter.
   d) Verify that water and debris can drain from forms through clean-out ports.

2. During Cold Weather:
   a) Remove ice and snow from within forms.
   b) Do not use de-icing salts.
   c) Do not use water to clean out completed forms, unless formwork and concrete construction will proceed within heated enclosure.
   d) Use compressed air or other means to remove foreign matter.

L. Form Release Agents

1. Before placing reinforcing steel and miscellaneous embedded items, coat contact surfaces of forms with an approved non-residual, low VOC form release agent in accordance with manufacturer's published instructions.
2. Do not allow release agent to accumulate in forms or come into contact with reinforcement or concrete against which fresh concrete will be placed.
   a) Coat steel forms with nonstaining, rust-preventative material.
3. Remove form release agent and residue from reinforcement or surfaces not requiring form coating.

M. Before Placing Concrete:

1. Inspect and check completed formwork, shoring and bracing to ensure that work is in accordance with formwork requirements of this section and Contract Documents, and that supports, fastenings, wedges, ties, and parts are secure.
   a) Make necessary corrections or adjustment to formwork to meet tolerance requirements.

2. Retighten forms and bracing before concrete placement to prevent mortar leaks and maintain proper alignment.

3. Notify Owner's Testing Agency sufficiently in advance of placement of concrete to allow inspection of completed and cleaned forms.

N. During Concrete Placement:

1. Maintain a check on formwork to ensure that forms, shoring, ties and other parts of formwork have not been disturbed by concrete placement methods or equipment.

2. Use positive means of adjustment as required for formwork settlement during concrete placing operations.

O. Camber:

1. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

2. Camber bottom forms where indicated on the drawings. Whenever forms are cambered, screeded levels for establishing top of concrete must be cambered to the same amount and to the same profiles such that scheduled depth of member is not reduced by lifting of forms. Check camber and adjust forms before initial set as required to maintain camber.

P. Expansion Joints:

1. Provide in exterior concrete paving on grade at maximum 24-feet on center or as noted and at intersections with vertical surfaces, curbs, manholes or other penetrations through paving.

2. Use fiber type expansion joint fillers typically and depress 1/4-inch unless otherwise noted.

3. Use cork type expansion joint fillers at conditions with non-bituminous waterproofing, liquid waterproofing or sealant systems.
Q. Construction Joints:

1. Provide where shown on the drawings as directed by the Architect and per CBC Section 1906A.4.
2. Provide key indentations at all joints.
3. Provide pour strips on inside face of forms at horizontal joints, but remove strips and thoroughly clean out reglets before placing subsequent portions of wall.
4. Prevent formations of shoulders and ledges.
5. Provide means for drawing forms into firm contact with concrete before placing additional concrete over previous pours where shrinking and warping has separated concrete from forms.

R. Surface Defects:

1. Install forms that will not impair the texture of the concrete and are compatible with the specified finish type.

3.2 REMOVING FORMS

A. Secure the Architect’s approval for time and sequence of form removal.

B. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 12 hours after placing concrete, provided concrete is sufficiently hard to avoid damage by form-removal operations, and provided curing and protection operations are maintained after removal of formwork.

C. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed until concrete has attained at least 75% of design compressive strength as proven by cylinder test. If stripping occurs before [3] days, 100% strength must be achieved.

1. Results of the cylinder break shall be presented to the Architect to demonstrate compliance with above specified strength requirements prior to form removal.
2. Provide reshores as required per ACI 347.
3. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members

D. Remove formwork progressively using methods to prevent shock loads or unbalanced loads from being imposed on structure. Forms shall be removed without damage to the concrete. Comply with ACI 347.

E. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

F. Reshore structural members where required due to design requirements, construction requirements, or construction conditions.

1. Reshore on same day shoring and forms are removed.
G. Whenever formwork is removed during the curing period, the exposed concrete shall be cured per requirements of Section 03 30 00.

H. All wood formwork, including that used in void spaces, pockets and other similar places shall be removed.

I. Form tie holes shall be filled as per approved samples submitted to the Architect and Engineer.

J. The Contractor shall assume responsibility for all damage due to removal of the forms.

3.3 RE-USING FORMS

A. Before forms can be re-used, surfaces that will be in contact with freshly poured concrete must be thoroughly cleaned, damaged areas repaired, projecting nails withdrawn, and forms must be straight and free from dirt or hardened concrete.

1. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable.

2. Apply new form release agent on re-used forms.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Reuse of formwork with repairs or patches which would result in adverse effects to architectural concrete finish will not be permitted.

C. Forms for exposed concrete may be reused only if the surfaces have not absorbed moisture and have not splintered, warped, discolored, stained, rusted or peeled, subject to acceptance by the Design Professionals. The Design Professionals reserve the right to require the Contractor to remove and reconstruct such formwork as will produce subsequent areas that are acceptable. Do not use "patched" forms for exposed concrete surfaces, unless approved by the Design Professionals.

D. Clean and repair any damage caused by placing, removal, or storage.

E. Store formwork in manner to prevent damage or distortion.

F. Reseal as required to achieve concrete of specified quality.

END OF SECTION
SECTION 03 20 00

CONCRETE REINFORCEMENT AND EMBEDDED ASSEMBLIES

PART 1 - GENERAL

1.1 GENERAL

Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

Provide all labor, materials, equipment, services and transportation for reinforcing steel, accessories, embedments and miscellaneous anchorage accessories, joint fillers, and waterstops for cast-in-place concrete work as shown on Drawings, as specified herein, and as required by the job conditions.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

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1.4 CODES AND STANDARDS

A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the latest editions of the standards referenced below and on the drawings.

B. Standards:


3. ACI 315 – Details and Detailing of Concrete Reinforcement.

4. ACI 318 – Building Code Requirements for Reinforced Concrete.

6. ASTM D3963 Fabrication and Jobsite Handling of epoxy Coated Steel Reinforcing Bars.

7. AWS D1.1 – Structural Welding Code-Steel.

8. AWS D1.4 – Structural Welding Code-Reinforcing Steel.


11. Concrete Reinforcing Steel Institute “Manual of Standard Practice”

C. Definitions:

1. The term “Contract Documents” in this specification is defined as the design drawings and the specifications.

2. The term “SER” in this specification is defined as the Structural Engineer of Record for the structure in its final condition.

3. The term “Design Professionals” in this specification is defined as the Owner’s Architect and SER.

4. The term “Contractor” in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.

5. The term “Owner’s Testing Agency” in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.

6. The terms “for record” and “submit for record” in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.

7. Working Days: Monday through Friday, excluding federal or state holidays.

1.5 QUALITY ASSURANCE

A. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust-stained concrete at his expense.

B. The Owner’s Testing Agency will:

1. Provide tests in accordance with the California Building Code (CBC) Section 1916A.2.

2. Collect mill test reports for reinforcement.
3. Take samples from bundles at fabricators:
   a. When bundles are indentified by the heat number and accompanied by mill analysis, two specimens shall be taken from each ten (10) tons, or fraction thereof, of each size and grade.
   b. When reinforcement is not positively identified by the heat numbers or when random sampling is intended, two specimens shall be taken from each 2-1/2 tons, or thereof, of each size and grade.
   c. All costs associated with the test of reinforcing that not have mill test reports will be at the contractor’s expense.

4. Test for tensile and bending strengths.

5. The Owner’s Testing Agency will inspect shop and field welding of reinforcing bars per CBC Chapter 17A.

6. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification in accordance with AWS D1.4. When reinforcement is to be welded, chemical analysis sufficient to determine carbon equivalent and minimum preheat temperature shall be performed when reinforcement does not conform to low-alloy steel requirements of American Society for Testing and Materials (ASTM) A706.

1.6 CONTRACTOR QUALIFICATIONS

A. The work of this section shall be performed by a fabricator specializing in reinforcing steel fabrication of type for cast-in-place concrete work required for this Project, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents.

1. Welders shall be qualified in accordance with AWS D1.4, within 12 months before starting the work.
   a. Make qualification records available to the Design Professionals upon request.

2. Work shall be performed in compliance with Owner’s insurance underwriters’ requirements.

B. Manufacturers shall specialize in manufacturing the types of concrete accessories required for cast-in-place concrete work, with a minimum of 10 years of documented successful experience and shall have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty for each type of accessory.

1.7 SUBMITTALS

A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.

1. Submittal Schedule: See Section 03 30 00.
2. Shop Drawings: Submit shop drawings that shall clearly indicate, but not be limited to:
   a. All details, dimensions and information required for fabrication and placement of concrete reinforcement in accordance with Contract Documents, prepared in accordance with ACI 315 recommendations.
   b. Elevations, plans, sections, and dimensions of concrete work with required reinforcement clearances.
   c. Ledges, brackets, openings, sleeves, anchor rods, embedments, prefabricated bent-in dowel keyway systems, electrical conduit and items of other trades including interference with reinforcing materials.
   d. Sizes, grade designations, spacing, locations, and quantities of wire fabric, reinforcement bars, temperature and shrinkage reinforcement dowels.
      i. Do not use dimensions scaled from Contract Drawings to determine bar lengths.
      ii. Hooks and bends not specifically dimensioned shall be detailed per ACI 318.
   e. Bending and cutting schedules, assembly diagrams, splicing and connection requirements, details, and laps.
   f. Each type of supporting and spacing devices, including miscellaneous accessories.
   g. Construction joint type, details and locations. Contractor shall coordinate with concrete pour schedule and submit for action by the Design Professionals.
   h. Submit comprehensive (a single drawing per area/element) layout/placement drawings. Drawings shall consolidate the work of all trades and shall be coordinated by the Contractor. Submit with or prior to reinforcement submittal for same element/area. Drawings shall include:
      i. Concrete accessories and embedded items, including fabrication details of items to be placed (exclusive of reinforcement.)
      ii. Opening in structural members, including floor slab, shearwalls, columns and beams.
      iii. Reproduction of structural drawings is not permitted.

3. Product Data – Submit for record for each type of product identified in Part 2. Product Data shall be clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published installation instructions and I.C.C reports, where applicable, for products of each manufacturer specified in this section.

   a. For each heat or melt of steel prior to delivery of material to the job site.
   b. Where reinforcing is to be welded, mill test reports shall verify the weldability of the reinforcing.
5. Hazardous Materials Notification: Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.

B. Submittal Process: See Division 03 30 00

C. SER Submittal Review: See Section 03 30 00

D. Substitution Request: See Division 03 30 00

E. Request for Information (RFI): See Section 03 30 00

1.8 DELIVERY, HANDLING, STORAGE

A. Comply with General Conditions and Division 1, including the following:
   1. Deliver reinforcing steel to Project site bundled, tagged and marked.
      a. Use weatherproof tags indicating bar sizes, lengths and other information corresponding to markings shown on placement diagrams.
      b. Take precautions to maintain identification after bundles are broken.
   3. During construction period, properly store reinforcing steel and accessories to assure uniformity throughout the Project.
   4. Deliver and store welding electrodes in accordance with AWS D1.4.
   5. Immediately remove from site materials not complying with Contract Documents or determined to be damaged.
   6. Store reinforcing steel above ground so that it remains clean.
      a. Maintain steel surfaces free from rust, grease, dirt, or other materials and coatings that might impair bond.
      b. Keep covered.
      c. Protect against corrosion or deterioration of any kind.

1.9 WARRANTY

A. Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
   1. Bars with kinks or bends not indicated on drawings or on approved shop drawings.
   2. Bars damaged due to bending, straightening or cutting.
   3. Bars heated for bending.
PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel:
   1. Type: Deformed billet steel bars, ASTM A 615, Grade 60 or 75 as indicated on drawings.
   2. Size: As indicated on structural drawings.
   3. Where indicated on drawings, reinforcing steel shall be hot-dipped galvanized after fabrication in accordance with ASTM A 767, Class II, with galvanizing material protected from embrittlement during galvanizing process in accordance with ASTM A 143.
      a. Galvanized finish shall meet the bend and shear test requirements of ASTM A 615.

B. Welded Wire Reinforcement:
   3. Size: As indicated on structural drawings.

2.2 ACCESSORIES

A. Tie Wire and Spirals:
   1. Type: ASTM A 82 (minimum 16 gauge annealed steel wire).
   2. Wire Bar Type: Comply with CRSI.

B. Mechanical Couplers:
   1. Provide mechanical couplers with a valid ICC-ES report from one of the following manufacturers: HRC 500/510 Xtender by Headed Reinforcement Corporation; Bartec by Dextra; Taperlock by Dayton Superior; Lenton Interlok LK Series by Erico; Lenton Standard and Transition Couplers A2/A12 Series by Erico; Lenton Form Saver Couplers by Erico; or equal product substituted per Division 1.
   2. Couplers shall be Type 2. Couplers shall develop 125-percent of the specified yield strength of the reinforcement and shall develop the specified tensile strength of the spliced bar.

C. Mechanical Bar Terminators:
   1. For bar sizes #11 (ø36) or smaller where specifically detailed on drawings, mechanical bar terminators shall be used.
2. Provide headed reinforcement with a valid ICC-ES report from one of the following manufacturers: HRC 555 Headed Bars by Headed Reinforcement Corp.; Bartec by Dextra; or equal product substituted per Section 01 25 00.

D. Supports for Reinforcement:

1. Types: Bolsters, chairs, spacers, clips, chair bars, and other devices for properly placing, spacing, supporting, and fastening the reinforcement, hot-dip galvanized after fabrication, in accordance with ASTM A123, or epoxy coated to match supported reinforcement.

2. For Contact with Forms: Use types with not less than 3/32” (2.5mm) of plastic between metal and concrete surface.
   a. Plastic tips shall extend not less than 1/2” (12mm) on metal legs.

3. Individual and continuous slab bolsters and chairs shall be of type to suit various conditions encountered and must be capable of supporting 300 pound (1.5kN) load without damage or permanent distortion.

4. Unless otherwise indicated on drawings, bottom reinforcing bars in footings shall be supported by precast concrete bricks or individual high chairs with welded sand plates on bottom.

5. Slabs on Grade reinforcement to be supported by precast concrete bricks or supports with sand plates or horizontal runners where base material will not support chair legs.

E. Welding Electrodes:

1. All welding shall be in conformance with AWS D1.4 and AWS A5.1.

2. Welded joints of ASTM A615, grade 60 bars shall be made with low hydrogen weld filler metals classified as E90 electrodes with a minimum tensile strength of 90 ksi.

3. Welded joints of ASTM A706, grade 60 bars shall be made with low hydrogen weld filler metals classified as E80 electrodes with a minimum tensile strength of 80 ksi.

2.3 JOINT FILLERS

A. Permanent Compressible Joint Filler:

1. Type: W. R. Meadows: “Ceramar” closed-cell expansion joint filler, ultraviolet stable, minimal moisture absorption, non-impregnated, nonstaining and nonbleeding, inert and compatible with cold-applied sealants.

2. Location of Use: Slabs and curbs as indicated on drawings or required.

3. Thickness: As indicated on drawings or required.

B. Temporary Compressible Joint Filler:

1. Type: White molded polystyrene beadboard.

2. Location of Use:
a. In slabs, curbs, and walls which must be removed prior to joint sealant installation.

b. Vertically to isolate walls from columns or other walls.

C. Noncompressible Joint Filler:
   1. Type: Dow Chemical's "STYROFOAM 40" rigid closed-cell extruded polystyrene board, square edges, 40 psi (275kPa) compressive strength, ASTM C 578, Type IV.
   2. Thickness: As indicated on drawings.
   3. Location of Use: As indicated on drawings or required.

D. Asphalt-Impregnated Joint Filler:
   2. Thickness: ¾" (12mm) maximum, as indicated on drawings or required.
   3. Location of Use: Sidewalks at foundation walls and as indicated on drawings or required.

E. Asphalt-impregnated fiberboard expansion joint filler for interior work:
   1. Type: ASTM D1751.

F. Self-expanding cork board expansion joint filler for exterior work:
   1. Type: ASTM D1752.

G. Construction Joints:
   1. Type: Tongue and groove type profile of galvanized steel, with knock-out holes at 6" (150mm) on center to receive dowelling, complete with anchorage.

2.4 WATERSTOPS

A. Preformed Bentonite Waterproofing Strips especially formulated for concrete cold joints at footings, walls, or slabs.
   1. Acceptable Products:
      a. Volclay Waterstop RX by CETCO Building Materials Group, Hoffman Estates, IL
      b. Adcor ES by W. R. Grace & Co., Cambridge, MA
   2. Size: 3/4" (20mm) by 3/8" (10mm) strips minimum, 25 ft. (7.5m) long, and weighing at least 0.165 lbs/ft (0.245kg/m).
   3. Location of Use: Concrete cold joints at footings, walls and slab joints.
   4. Comply with manufacturer product application and installation instructions.
B. Polyvinyl Chloride Waterstops:


PART 3 - EXECUTION

3.1 FABRICATION

A. Reinforcing Steel Fabrication:

1. Fabricate in accordance with approved shop drawings, ACI 315 and Contract Documents.

2. Heating of Reinforcement: Will be permitted only with specific prior approval of the SER.

   
   a. Employ shielded metal-arc method and conform to AWS D1.4.
   
   b. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.
   
   c. Only welders specifically certified for reinforcing steel in accordance with AWS D1.4 shall perform welding of reinforcing steel.

4. Tolerances: Comply with ACI 117.

5. Unacceptable Materials: Reinforcement with any of following defects will not be permitted in Work.
   
   a. Bar lengths, depths, and bends exceeding ACI fabrication tolerances.
   
   b. Bends or kinks not indicated on Drawings or final shop drawings.
   
   c. Bars with reduced cross-section due to excessive rusting or other cause.

B. Welded Wire Reinforcement:

1. Type: As fabricated in accordance with CRSI, unless otherwise noted.

C. Templates:

1. Required for all footing and column dowels, and where required for proper alignment of reinforcing.

D. Assemblies:

1. Fabricate and assemble structural steel items in shop in conformance with the latest editions of AISC 360, AISC 303, Section 05 12 00, Section 05 12 10 and AWS D1.1. Shearing, flame cutting, and chipping shall be done carefully and accurately. Cut, drill, or punch holes at right angles to the surface of the metal. Do not make or enlarge holes by burning. Holes shall be clean-cut without torn or ragged edges.
2. Welding of deformed bar anchors and welded studs shall be installed by full-fusion process equivalent to TRW Nelson Stud Welding Division or KSM Welding Services Division, Omark Industries.

3. Welding of reinforcement shall be done in accordance with AWS requirements. Welding shall be performed subject to the observance and testing by Owner's Testing Laboratory.

4. Galvanizing where required, shall be applied after fabrication and prior to casting concrete.

5. Welding of crossing bars (tack welding) for assembly of reinforcement is not permitted without use of weldable reinforcement and express written consent of SER.

3.2 INSTALLATION OF REINFORCEMENT

A. General:

1. Perform the work of this section in accordance with approved shop drawings, ACI 318 and CRSI recommended practice for “Placing Reinforcing Bars”, for details and methods of reinforcement placement and supports, and as specified.

2. Before placing reinforcement steel, inspect forms for proper fitting and compliance with allowable tolerances.

3. Reinforcement shall be free of form coatings, sealers, powdered and scaled rust, loose mill scale, earth, ice, and other materials which will reduce or destroy bond with concrete.

4. Do not place concrete until the completed reinforcement steel work has been observed and accepted by Owner's Testing Laboratory.

5. Reinforcement steel is not permitted to be “floated into position”.

6. Bend bars cold.
   a. Do not heat or flame cut bars.
   b. No field bending of bars is permitted, unless specifically approved by the SER and tested by Independent Testing Laboratory for cracks.

7. Weld only as indicated.
   b. See structural drawings for additional requirements.

8. Tag reinforcement steel for easy identification.

9. Contractor shall coordinate the placement of the reinforcing indicated on the drawings to avoid interference while maintaining minimum cover requirements.

10. All reinforcement shall be continuous. See drawings for lap splice schedule. Stagger splices where possible. Contact lap splices shall be securely wired together to maintain alignment.
11. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.

12. Do not bend bars around openings or sleeves. Wherever conduits, piping, inserts, sleeves, etc. interfere with placing of reinforcement, obtain the Architect’s approval of placing before placing concrete.

B. Placement of Reinforcement Bars:
   2. Accurately position, support and secure reinforcement in a manner to prevent displacement before and during placement of concrete.
      a. Place reinforcement bars within tolerances specified in ACI 117 and CBC 1907A.5.
      b. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, hangers and other accessories for fastening reinforcing bars and welded wire reinforcement in place.
   3. If bars are displaced beyond specified tolerance when relocating the bars to avoid interference with other reinforcement or embedded items, notify the Design Professionals for approval prior to concrete placement.
   4. Avoid cutting or puncturing vapor retarder during reinforcement placement.
      a. Repair damages before placing concrete.
   5. Concrete Coverage: Maintain concrete cover around reinforcement as indicated on drawings.
   7. Tie Wires: After cutting, turn tie wires to the inside of section and bend so that concrete placement will not force ends to be exposed at face of concrete.

C. Placement of Wire Reinforcement:
   1. Install in lengths as long as practicable.
   2. Support in position adequately to prevent bending of reinforcement between supports before and during placement of concrete.
   3. Overlap the wire reinforcement 6” (150mm) or one panel width + 2” (50mm), whichever is larger.
      a. Securely tie together with wire.
   4. Offset laps of adjoining widths to prevent continuous laps in either direction.
   5. Locate wire fabric in the top third of slabs, unless noted otherwise on structural drawings.

D. At Construction Joints:
   1. Reinforcement bars and wire reinforcement shall be continuous through construction joints, unless otherwise indicated on Drawings. See Drawings for scheduled lap splices.
E. At Expansion Joints:
   1. Reinforcing bars and wire fabric shall not be continuous through expansion joints, unless otherwise indicated on drawings.

F. Splicing:
   1. Unless otherwise indicated on drawings provide lap splices for bar sizes #11 (Ø36) and smaller by lapping ends, placing bars in contact, and tying tightly with wire in accordance with requirements of ACI 318 for lap lengths indicated on drawings.
   2. At all #14 (Ø43) and #18 (Ø57) bars and where mechanical splices are specifically indicated on drawings, comply with requirements specified in this Specification section under “Mechanical Couplers”.
   3. Do not splice reinforcement except as indicated on structural drawings.
   4. Tension couplers may be used and installed per manufacturer’s specifications where indicated on drawings or as approved by Engineer.

G. Reinforcement for Shotcrete Applications:
   1. Place reinforcement in accordance with CBC Section 1913A.

3.3 INSTALLATION OF ACCESSORIES

A. Install concrete accessories in accordance with manufacturer’s published instructions and Contract Documents.
   1. Set and secure embedments, including embedded plates, bearing plates, and anchor bolts, per approved setting drawings and in such a manner to prevent movement during placement of concrete and to allow removal of formwork without damage.
   2. Inspect locations to receive concrete accessories.
   3. Immediately report to the Design Professionals in writing of conditions that will adversely affect the Work or fails to meet Contract Document requirements.
   4. Do not place concrete until reinforcement, accessories and other built-in items have been inspected and accepted by Owner’s Testing Laboratory.

B. Construction and Contraction (Control) Joints:
   1. Construction and contraction (control) joints indicated on drawings are mandatory and must not be omitted.
      a. Provide construction joints in accordance with ACI 318.
   2. Provide waterstops in construction joints as indicated on the Contract Documents in sizes to suit joint.
   3. Install waterstops to form continuous diaphragm in each joint.
   4. Support and protect exposed waterstops during progress of Work.
5. Field-fabricate joints in waterstops according to manufacturer’s printed instructions.

C. Coordinate the installation of pipes, bolts, hangers, anchors, flashing and other embedded items with the work of other trades.

3.4 FIELD QUALITY CONTROL

A. General: The Owner’s Testing Laboratory shall test and inspect concrete reinforcement and embedded assemblies as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Design Professionals for final acceptance.

B. Owner’s Testing Laboratory shall provide qualified personnel at site to inspect reinforcement and embeds using the latest Drawings and reviewed shop drawings, as follows:

1. Prior to placement, inspect reinforcement and embeds for grade, quality of material, absence of foreign matter, and for suitable storage.

2. Provide continuous inspection of reinforcement and embedded assemblies during placement and immediately prior to concreting operations for: size, quantity, vertical and horizontal spacing and location, correctness of bends and splices, mechanical splices, clearances, compliance with specified tolerances, security of supports and ties, concrete cover, and absence of foreign matter.

C. Owner’s Testing Laboratory shall submit inspection, observation, and/or test reports to the Design Professionals as required herein and shall provide an evaluation statement in each report stating whether or not concrete reinforcement and embedded assemblies conforms to requirements of Specifications and Drawings and shall specifically note deviations there from.

D. Immediately report deficiencies to the Contractor. Contractor shall prepare proposed remedy for deficiency. Contractor shall present proposal to the Design Professionals for approval. After an approved proposal is accepted by the Design Professionals, the Contractor shall correct the deficiency at no cost to the Owner.

END OF SECTION
SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL

Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

Provide all labor, materials, equipment, services and transportation required to complete all concrete work as shown on Drawings, as specified herein, and as required by the job conditions. This specification is not intended to address the particular requirements of Architectural Concrete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- Submittals
- Quality Control
- Concrete Formwork
- Concrete Reinforcement and Embedded Assemblies
- Structural Steel Framing
- Metal Fabrications
- Thermal and Moisture Protection

1.4 CODES AND STANDARDS

A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.

B. Standards, latest edition of each:

2. ACI 301 – Standard Specifications for Structural Concrete.
3. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
4. ACI 304 – Recommended Practice for Measuring, Mixing and Placing Concrete.
7. ACI 308R – Guide to Curing Concrete.
9. ACI 318 – Building Code Requirements for Structural Concrete.
10. American Concrete Institute “Manual of Concrete Practice”, various committee reports as referenced herein.
12. ASTM C1202 – Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration
14. AASHTO T318 – Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.
16. State of California, Department of Transportation (CalTrans) “California Test Methods,” various standard tests as listed herein.

C. Definitions:

1. The term “Contract Documents” in this specification is defined as the design drawings and the specifications.

2. The term “SER” in this specification is defined as the Structural Engineer of Record for the structure in its final condition.

3. The term “Design Professionals” in this specification is defined as the Owner’s Architect and SER.

4. The term “Contractor” in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.

5. The term “Testing Agency” in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing.
of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.

6. The terms "for record" and "submit for record" in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.

7. Working Days: Monday through Friday, excluding federal or state holidays.

1.5 CONCRETE CONTRACTOR QUALIFICATIONS

A. The work of this section shall be performed by a company which specializes in the type of concrete work required for this Project, and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.

B. Contractor's Testing Agency Services: Required as specified in Division 1, and herein.

C. Materials and installed work may require testing and retesting at anytime during progress of work, as directed by Design Professionals. Tests, including retesting of rejected materials for installed work will be done at Contractor's expense.

1.6 SUBMITTALS

A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.

1. Submittal Schedule: The contractor shall submit for approval a schedule at least twenty (20) working days prior to commencing submittals.

a. This schedule shall include a list, in order of date to be submitted, of all drawings and other required submittal items scheduled to be submitted. The schedule shall list the proposed submittals for each week, as well as their formats. Once shop drawing submissions have commenced any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place.

b. If at any time the total number of shop drawings received in any one week period exceeds the amount in the approved schedule by more than 10% for that week, the Design Professionals have the right to add two days to the average turnaround time for each 20% increment in excess of the scheduled quantity for that week's submissions. For example if the weekly total exceeds the schedule by 10% to 20%, two days may be added; if it is exceeded by 21% to 40%, four days may be added. The return dates for subsequent submittals may be extended based on the additional review time stated above.

3. Mix Designs: Submit concrete mix designs for each type and strength of concrete required for this Project at least thirty (30) days before placing concrete. The Contractor shall perform test or assemble the necessary data indicating conformance with specifications.

   a. Mix designs shall be prepared or reviewed by an approved independent testing agency retained by the Contractor in accordance with requirements of ACI 301 and ACI 318, signed by a registered design professional licensed to practice as a Professional Engineer in the state where the project is located, and shall be coordinated with design requirements and Contract Documents.

   b. Before submitting to Owner’s Testing Agency, submit complete mix design data for each separate mix to be used on the Project in a single submittal. Clearly identify the intended use of each mix (foundations, slabs on grade, etc.)

   c. Data shall be from the same production facility that will be used for this Project.

   d. Samples shall be provided only as requested by the Architect.

      i) Certification from vendor that samples originate from and are representative of each lot proposed for use.

   e. Mix Design data shall include but not be limited to the following:

      i) Locations on the Project where each mix design is to be used corresponding to Structural General Notes on the Drawings.

      ii) Design Compressive Strength: As indicated on the Drawings.

      iii) Proportions: ACI 301 and ACI 318.

      iv) Gradation and quality of each type of ingredient including fresh (wet) unit weight, aggregates sieve analysis.

      v) Water/cementitious material ratio.

      vi) Certification that portland cement meets Specification requirements.

      vii) Evaluate and classify fly ash in accordance with ASTM D 5759.

      viii) Report chemical analysis of fly ash in accordance with ASTM C 311.

      ix) Classify blast furnace slag in accordance with ASTM C 989.

      x) Slump: ASTM C 143.

      xi) Air content of freshly mixed concrete by the pressure method, ASTM C 231, or the volumetric method, ASTM C 173.

      xii) Unit Weight of Concrete: ASTM C 138.
xiii) Design strength at 28, 56 or 90 days, as indicated on Contract Documents: ASTM C 39.

   a) Document strength based on basis of previous field experience or trial mixtures per ACI 301. Proportioning by Water-Cement Ratio is not permitted.

   b) Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard deviation calculation, and determination of required average compressive strength. Submitted compression strength test reports shall conform to CBC Section 1905A.

   c) If early concrete strengths are required, contractor shall submit trial mixture results as required.

xiv) Test records to support proposed mixtures shall be no more than 24 months old and use current cement and aggregate sources. Test records to establish standard deviation may be older if necessary to have the required number of samples.

xv) Manufacturer’s product data for each type of admixture.

xvi) Manufacturer’s certification that all admixtures used are compatible with each other.

xvii) All information indicating compliance with Contract Documents including method of placement and method of curing.

xviii) Normalweight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.

xix) Certification from a qualified testing agency indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity in accordance with ASTM C 33

4. Hot and Cold Weather Procedures: Submit for record to Design Professional’s written procedures for placement of concrete in hot and cold weather conditions. Hot and Cold weather are as defined in the Concrete Placement section of this specification.

5. Product Data: Submit product data clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published application instructions, product characteristics, compatibility and limitations for each of the following:

   a. Bonding agents.
b. Curing compound and liquid sealer densifier. Submit for record to Design Professionals a written statement guaranteeing that the compound will not leave discoloration on concrete to be left exposed, or affect the bond for paint or other applied finishes. Include provision in written statement that in the event of failure of applied finishes to bond to membrane cured concrete, to remove the curing compound and leave suitable surfaces for bonding such finishes.

c. Absorptive covers and moisture retaining covers.

d. Vapor Retarder: See Division 7, Thermal and Moisture Protection.

e. Grout: Submittal of Grout not by manufacturers listed herein must be accompanied by independent certification of ASTM C 1107 compliance without modification of standard methods.

f. Other products proposed by contractor

6. Submit Concrete Weighmaster affidavit if continuous inspection of batch plant has been waived per Section 1.9 F.

7. Concrete Joint Locations: Submit plans indicating locations and details of construction joints, contraction joints, waterstops, sleeves, embedments, etc that interact with the joints. Contractor to coordinate joint location with reinforcement shop drawings. Reinforcement shop drawings shall indicate additional reinforcement bars where required at construction joints.

Joint locations for concrete slabs to receive a terrazzo or similar finish subject to reflective cracking must be coordinated with layout of finish drawings.

8. Preconstruction Survey: Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Design Professionals.


11. Hazardous Materials Notification: Submit for Record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation. Submit for Record.

B. Submittal Process

1. Submittal of shop drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with
other drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.

2. Shop drawings: Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable drawings used in the development of the shop drawings shall be referenced on each shop drawing to facilitate checking.

3. The Contractor shall submit to the Design Professionals two (2) black line prints and one (1) electronic copy for shop drawing review. If the Contractor and Design Team agree to process shop drawings electronically, Contractor shall submit one hardcopy and one electronic copy to the SER. The naming convention of each drawing must follow the submittal numbering system and include the submittal number, specification number, revision number and drawing number in the prefix of the drawing name.

4. The Contractor shall allow at least ten (10) working days between receipt and release by the SER for the review of shop drawings and submittals.

5. All modifications or revisions to submittals and shop drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Design Professionals:
   a. Failure to specifically cloud modifications
   b. Unapproved revisions to previous submittals
   c. Unapproved departure from Contract Documents

6. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal. Do not include new content not previously reviewed.

7. Resubmittals Compensation: The Contractor shall compensate the Design Professionals for submittals that must be reviewed more than twice due to contractors’ errors. The Contractor shall compensate the Design Professionals at standard billing rates plus out-of-pocket expenses incurred at cost + 10%.

8. The Contractor shall deliver to the Design Professionals at the completion of the job two (2) copies of the electronic version of the final as-built shop drawings on a CD-ROM or other media acceptable to the Design Professionals.

C. SER Submittal Review

1. The Design Professionals’ review and approval of shop drawings and other submittals shall be for general conformance with the design intent of the work and with the information given in the Contract Documents only and will not in any way relieve the Contractor or the Contractor’s Engineer from:
a. Conforming to the Contract Documents.

b. Coordination with other trades.

c. Responsibility for all required detailing and proper fitting of construction work.

d. The necessity of furnishing material and workmanship required by drawings and specifications which may not be indicated on the shop drawings.

e. Control or charge of construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the work.

2. TYPE 1 Stamp - For shop drawings for building elements designed by the SER, the responses on the shop drawing review stamp used by the SER require the following actions:

a. APPROVED indicates that the SER has found that the information presented on the shop or erection drawing appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.

b. APPROVED AS NOTED indicates that the SER requires the shop or erection drawing to be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected shop or erection drawing for record.

c. REVISE and RESUBMIT indicates that the SER requires resubmission of the shop or erection drawing after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.

d. NOT APPROVED indicates that the shop or erection drawing does not conform to the Contract Documents and must be extensively revised before re-submittal. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.

3. TYPE 2 Stamp - For submittals for building elements which are not designed by the SER but are performance specified, for items that do not form part of the completed structural system but impose loads on the structure, and for construction items or activities which have an effect on the final structure, a second stamp will be used. The responses on the stamp used by the SER require the following actions:

a. NO EXCEPTION TAKEN indicates that the SER has found that the information presented on the submittal appears to conform to the requirements of the
Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.

b. EXCEPTIONS NOTED indicates that the SER requires the submittal be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected document for record.

c. REJECTED indicates that the SER requires resubmission of the submittal after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed. Contractor to revise and resubmit until SER response of No Exceptions or Exceptions Noted is received.

D. Substitution Request

1. Requests for any departure from Contract Documents must be submitted in writing by the Contractor and accepted in writing by the Design Professionals, prior to receipt of submittals.

2. All substitutions must be requested using the structural substitution request form included at the end of this section. Acceptance using the structural substitution request form indicates acceptability of the structural concept only. Contractor must submit shop drawings reflecting accepted substitutions for review in accordance with this Specification. The structural substitution request form, even if accepted, does not constitute a change order.

3. Accepted substitutions or modifications shall be coordinated and incorporated in the work at the sole expense of the Contractor.

4. The acceptance by the Design Professionals of a specific and isolated request by the contractor to deviate from these requirements does not constitute a waiving of that requirement for other elements of, or locations in the project, unless specifically addressed as such and permitted by the Design Professionals in writing.

5. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated for the review and/or incorporation of the Contractor-requested substitution, including indirect effects on other portions of the work, the Contractor is responsible for paying for additional work performed by the Design Professionals at the standard billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.

6. Contractor is responsible for means and methods and any impacts on other portions of the work that may arise from this substitution.

E. Request for Information (RFI)
1. RFIs shall be submitted by the General Contractor or Construction Manager. RFIs submitted by other entities will be returned with no response.

2. Limit RFI to one subject.

3. Submit RFI immediately upon discovery of the need for interpretation or clarification of the Contract Documents. Submit RFI within timeframe so as not to delay the Construction Schedule while allowing the full response time described below.

4. The response time for answering an RFI depends on the category in which it is assigned.

   a. Upon receipt by the SER, each RFI will be assigned to one of the following categories:

      i) No cost clarification

      ii) Shown in Contract Documents

      iii) Change to be issued in future document revision

      iv) Previously answered

      v) Information needs to be provided by others.

      vi) Request for corrective field work

      vii) Request for substitution

   b. RFIs in categories 1, 2, 3, 4 and 5 will be turned around by the SER on average of five (5) working days.

   c. RFIs in categories 6 and 7 will be rejected and must be submitted as submittals or requests for substitution.

1.7 STORAGE, HANDLING AND DELIVERY

A. Comply with General Conditions and Division 1.

B. Storage:

   1. Store materials in accordance with ACI 304R.

   2. Store cement and supplementary cementitious materials in weathertight buildings, bins or silos that will exclude moisture and contaminates.

   3. Store admixtures to avoid contamination, evaporation, damage, and in accordance with manufacturer's temperature and other recommendations.

   4. Keep packaged material in original containers with seals unbroken and labels intact until time of use.
C. Handling:

1. Handle fine and coarse aggregates as separate ingredients.
2. Arrange aggregate stockpiles to avoid excessive segregation, and prevent contamination with other materials or with other sizes of like aggregates.
3. Do not use frozen or partially frozen aggregates.
4. Allow sand to drain until it has reached relatively uniform moisture content before use.
5. Protect liquid admixtures from freezing and temperature changes that would adversely affect characteristics, and in accordance with manufacturer's recommendations.

1.8 PRE-INSTALLATION CONFERENCE

A. At least 30 working days prior to the start of concrete construction, the Contractor shall hold a meeting to review the approved concrete mix designs and to determine the procedures for producing proper concrete construction. The Contractor shall notify the Design Professionals of the meeting and require responsible representatives of every party who is concerned with the concrete Work to attend the conference, including but not limited to the following:

1. Contractor.
2. Owner’s Testing Agency representative
3. Concrete Subcontractor.
5. Admixture manufacturer(s).

B. Minutes of the meeting shall be recorded and distributed by the Contractor to all parties concerned within five working days of the meeting. One copy of the minutes shall also be furnished to the following:

1. Design Professionals.
2. Owner’s Representative.

C. The minutes shall include a statement by the concrete contractor and admixture manufacturer(s) indicating that the proposed mix design and placing, finishing, and curing techniques can produce the concrete properties and quality required by these specifications.

1.9 QUALITY ASSURANCE BY OWNER’S TESTING AGENCY

A. Quality assurance is testing and inspection to assist the Owner in evaluating the Contractor's performance.
B. Cost: Except as specifically noted otherwise, the testing agencies for quality assurance shall be engaged and paid by the Owner.

C. Coordination with Owner’s Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Owner’s Testing Agency in the performance of their work and shall provide the following:

1. Information as to time of starting field construction and concrete placement schedule, one week prior to the beginning of the work. This information shall be shared with the Architect.

2. Site File: At least one copy of each approved shop drawing shall be kept available in the contractor’s field office. Drawings not bearing evidence of approval and release for construction by the Design Professionals shall not be kept on the job.

3. Full and ample means of assistance for testing and inspection of material

4. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field

D. Duties of the Owner’s Testing Agency:

1. Reports: The Testing Agency shall prepare daily reports of the concrete work including progress and description/area of work, tests made and results. The daily reports shall be collected and delivered to the Design Professionals, DSA and Owner weekly.

2. Rejection: The Owner’s Testing Agency has the right to reject any material, at any time, when it is determined that the material or workmanship does not conform to the Contract Documents. The Testing Agency shall report deficiencies to Owner, Design Professionals, and Contractor immediately.

3. Remedial Work: The Testing Agency shall indicate to the Contractor where remedial work must be performed and will maintain a current list of work not in compliance with the Contract Documents. This list shall be submitted to the Design Professionals and Owner on a weekly basis.

4. Certification: When all work has been approved by the Testing Agency, the Testing Agency shall certify in a letter to the Design Professionals and Owner that the installation is in accordance with the design and specification requirements.

E. Waiver of Batch Plant Inspection

1. Continuous batch plant inspection may be waived in accordance with CBC Section 1704A.4.3 if the plant complies with ASTM C94 and has been certified by an agency acceptable to DSA to comply with the requirements of the National Ready Mix Concrete Association.
2. When batch plant inspection is waived, the following requirements shall apply:
   a. Approved inspector of the testing agency shall check the first batching at the start of work and furnish mix proportions to the licensed weighmaster.
   b. Licensed weighmaster to positively identify materials as to quantity and certify to each load by a ticket.
   c. Tickets shall be transmitted to the inspector of record by a truck driver with load identified thereon. The inspector will not accept the load without a load ticket identifying the mix and will keep a daily record of placements, identifying each truck, its load and time of receipt and approximate location of deposit in the structure and will transmit a copy of the daily record to the enforcement agency.
      i) Exception: (DSA-SS) The term “inspector of record” is synonymous with “project inspector”.
   d. At the end of the project, the weighmaster shall furnish an affidavit to the enforcement agency certifying that all concrete furnished conforms in every particular to proportions established by mix designs.

F. Field Quality Assurance

1. General: The Owner’s Testing Agency shall test and inspect concrete materials and operations as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Design Professional for final acceptance. Perform testing in accordance with ACI 318 and CBC Section 1903A, 1905A, 1916A and 17A.

2. Owner’s Testing Agency is responsible for monitoring concrete placement as follows:
   a. Owner’s Testing Agency shall provide qualified personnel at site to monitor concreting operations as follows:
      i) Verify use of required design mix
      ii) Record location of point of concrete discharge of each batch truck tested, cross referenced to grid lines.
      iii) Record temperature of concrete at time of placement.
      iv) Record weather conditions at time of placement, including temperature, wind speed, relative humidity, and precipitation.
      v) Record types and amounts of admixtures added to concrete batches, including that added after departure of concrete trucks from batch plant.
vi) Record amounts of and monitor dosing of high-range water-reducing admixtures added at site for site-added admixtures and redosing for plant-added admixtures.

vii) Record amounts of and monitor dosing of high-range water-reducing admixtures added at site for site-added admixtures and redosing for plant-added admixtures.

viii) Record amount of water added at the site and verify that total water content does not exceed amount specified in the mix design. Addition of water at the site is subject to prior approval by the Design Professional.

ix) Monitor consistency and uniformity of concrete.

x) Monitor preparation for concreting operations, placement of concrete, and subsequent curing period for conformance with Specifications for following procedures:

   a) Concrete curing.

   b) Hot weather concreting operations.

   c) Cold weather concreting operations.

3. Owner's Testing Agency shall conduct tests of concrete as follows and in accordance with ASTM C 1077:

   a. Testing frequency: Sample sets for all tests listed below of each concrete design mix placed each day shall be taken not less than once a day, nor less than once for each 50 cu.yd. of concrete, nor less than once for each 2500 square feet of surface area for slabs or walls. Additional tests shall be performed if deemed necessary by the Owner's Testing Agency and Design Professionals. Sample all columns, regardless of other frequencies listed above. In addition, sample each truckload used for columns, regardless of other frequencies listed above. Testing frequency shall conform to CBC section 1905A.6.2.1.

   b. Obtain each test sample from different batches selected on a strictly random basis before commencement of concrete placement. Record location in structure of sampled concrete.

   c. Determine air content of normal weight concrete in accordance with either ASTM C 231 or ASTM C 138. Determine air content of lightweight concrete in accordance with ASTM C 173.

   d. Determine unit weight of normal weight concrete in accordance with ASTM C 138 and lightweight concrete in accordance with ASTM C 567.

   e. For concrete with air content specified in Contract Documents, conduct one test for air content for each strength test required or for every 50 cubic yards of fly
ash concrete placed, whichever is less. Test in accordance with ASTM C 173 or ASTM C 231.

f. The water content of freshly mixed concrete will be tested on a random basis, a minimum of once per 100 cubic yards or every 5000 square feet of concrete placement, during placement in accordance with AASHTO T 318 for the following concrete types:

i) Architecturally exposed hard troweled slabs

ii) Slab to receive a bonded finish floor material

iii) Concrete with specified compressive strength exceeding 6000 psi

g. Conduct slump tests in accordance with ASTM C 143 and ASTM C172. Take samples for slump test at the point of placement of concrete.

h. Conduct slump tests for concrete enhanced with high-range water-reducing admixtures as follows:

i) Concrete with plant added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site. Batches delivered to site with slumps in excess of the range defined in the mix design submittal or with excessive segregation as defined in the ACI Manual of Standard Practice Part I shall be rejected.

ii) Concrete with site added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site and after addition of high-range water-reducing admixtures for conformance to initial water slump and final slump requirements.

iii) Concrete shall also be sampled at point of initial discharge for conformance to slump and/or slump-flow requirements. Visually observe slump-flow at point of concrete placement. If slump loss is visually observed to exceed the range specified for mix design, perform additional slump test at point of discharge from concrete pump hose.

i. Conduct strength tests of concrete as follows:

i) Test concrete for required compressive strength in accordance with CBC Section 1905A.6.

ii) Secure sample sets in accordance with ASTM C 172.

iii) Mold cylinders in accordance with ASTM C 31 and cure under standard moisture and temperature conditions in accordance with ASTM C 31, Section 7 (a). Quantity of cylinders listed below is based on a cylinder size of 4 inch diameter x 8 inches long. If 6 inch diameter by 12 inch long cylinders are used, the total quantity of cylinders may be reduced by one with two
cylinders instead of three tested at the age designated for determination of \( f'c \).

iv) Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site.

v) Test cylinders in accordance with ASTM C 39. For specified concrete strength of 10,000 psi and above, cylinders shall be ground and not capped.

vi) For 28 day mixes mold five cylinders. Test one cylinder at seven days and three cylinders at 28 days. The 28 day strength shall be the average of the three 28 day cylinders. One cylinder shall be retained in reserve for later testing if required.

vii) For 56 day mixes mold six cylinders. Test one cylinder at seven days, one cylinder at 28 days, and three cylinders at 56 days. The 56 day strength shall be the average of the three 56 day cylinders. One cylinder shall be retained in reserve for later testing if required.

viii) For 90 day mixes mold seven cylinders. Test one cylinder at seven days, one at cylinder at 28 days, one cylinder at 56 days, and three cylinders at 90 days. The 90 day strength shall be the average of the three 90 day cylinders. One cylinder shall be retained in reserve for later testing if required.

ix) When high early strength concrete is required by contractor, additional cylinders shall be made and tested as required at Contractor’s expense.

x) If one cylinder in a test manifests evidence of improper sampling, molding or other damage, discard cylinder and base test results on that of remaining cylinder.

4. Owner’s Testing Agency shall evaluate concrete for conformance with Specifications as follows:

a. Slump:

i) Owner’s Testing Agency shall maintain a slump moving average, comprised of the average of all batches or most recent five (5) batches tested, whichever is fewer.

b. Strength test:

i) Owner’s Testing Agency shall maintain a compressive strength moving average, comprised of three (3) consecutive strength test results, for each mix design used in Work.

ii) Strength level of concrete will be considered satisfactory provided averages of all sets of three (3) consecutive strength test results (i.e. moving average)
equal or exceed specified 28-day strength, and no individual strength test result falls below specified 28-day strength by more than 500 psi.

iii) If strength tests fail to meet minimum requirements, concrete represented by such tests shall be considered questionable and shall, if deemed appropriate by the SER, be subject to further evaluation by core testing as specified herein.

c. Conduct core tests on questionable concrete in accordance with ACI 318 and ASTM C 42. Contractor to pay the Owner’s Testing Agency for the cores.

i) Location of cores shall be coordinated with Design Professionals so as to least impair strength of structure. Before testing cores, discard and replace any that show evidence of having been damaged subsequent to or during removal from structure or which have reinforcement present.

ii) Cores from structure exposed to soil or constant moisture in service (e.g. basement walls, retaining walls, slab-on-grade, piers, footings, etc.) shall be tested in a fully saturated condition. Cores for all other concrete may be tested dry. Prior to commencement of coring, verify with Design Professionals whether cores are to be tested wet or dry.

iii) Fill core holes with low slump concrete or mortar with a strength equal to or greater than that specified for area cored.

d. Concrete in area represented by core test will be considered adequate if average strength of cores is equal to at least 85% of, and if no single core is less than 75% of, specified strength.

5. Floor flatness and levelness tolerance compliance testing is to be performed within 72 hours of concrete placement by Owner’s Testing Agency, and prior to the removal of shores and forms.

G. Owner’s Testing Agency shall submit inspection, observation, and/or test reports to the Owner and Design Professionals, as required herein and shall provide an evaluation statement in each report stating whether or not concrete placement conforms to requirements of Specifications and Drawings and shall specifically note deviations therefrom.

H. Immediately report deficiencies to the Contractor, Owner and Design Professionals.

1.10 QUALITY CONTROL BY CONTRACTOR

A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained. The Contractor shall bear burden of proof that concrete meets minimum requirements.

B. The Owner’s general review during construction and activities of the Owner’ Testing Agency are undertaken to inform the Owner of performance by the Contractor but shall in no way
replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.

C. The Contractor shall immediately report to the Design Professionals any deficiencies in the work which are departures from the Contract Documents. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Design Professionals. After proposed corrective action is accepted by the Design Professionals and Owner, the Contractor shall correct the deficiency at no cost to the Owner.

1.11 OBSERVATIONS AND CORRECTIONS BY DESIGN PROFESSIONALS

A. Review: The Design Professional will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.

B. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated by failure of the Contractor to perform the work in accordance with the Contract Documents, the Contractor is responsible for paying for the additional work at the Design Professionals’ standard firm-wide billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.

1.12 PERMITS AND WARRANTY

A. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City, State, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Owner and Design Professionals.

B. Warranty: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:

1. Oily, waxy or loose residue which may interfere with the bonding or discoloration of various applied Architectural finish materials.

2. Discoloration of concrete surfaces scheduled to remain exposed as a finish.

3. Areas which show surface failure or defects.

4. Areas which puddle water.

5. Areas which are not properly prepared to receive Architectural finish materials. If necessary, the Contractor, at his own expense, shall have the Owner's Testing Agency perform appropriate tests for bond and discoloration.

6. Patches that become crazed, cracked or sound hollow when tapped.

7. Self-leveling concrete topping that has cracked, spalled and/or not performed in accordance with manufacturer's design criteria.
PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS & PRODUCTION

A. Portland Cement:

1. ASTM C150, Type I or Type II. (Type II/V is acceptable)

2. ASTM C150, Type III, High-early Strength Portland Cement may be used subject to review and approval of Structural Engineer. The specified 28-day concrete compressive strength shall occur within 7 days for concrete using Type III Portland Cement.

3. Provide the same brand of Portland Cement from a single source throughout the project, as required to meet Design Professionals’ requirements.

4. Provide Portland Cement that is uniform in color.

B. Aggregates for Normalweight Concrete:

1. ASTM C 33

2. Coarse Aggregates: Crushed stone or gravel. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. Cleanliness value shall not be less than 75 when tested per CalTrans California Test 227 and conforming to CBC Section 1903A.5.

3. Fine Aggregate: Natural sand, or sand prepared from stone or gravel, clean, hard, durable, uncoated and free from silt, loam and clay. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.

4. If the source of aggregates is changed during the Project, the Contractor shall supply test data showing that the new aggregates have a successful history of use with the portland cement used on the job.

5. Provide aggregates from a single source throughout the project for exposed concrete.

6. The acceptability of aggregates for the work will depend on proof that their potential alkali reactivity is not deleterious to the concrete.

7. Do not use fine or coarse aggregates that contain substances that cause spalling.

8. Maximum coarse aggregate size shall conform to the requirements as specified in ACI 301 but shall not exceed the following:
   
   - Size no. 57 for footings, and slabs-on-grade
   - Size no. 67 for all other locations

9. Contractor shall furnish concrete with maximum 3/8" aggregate at no additional cost to the Owner if areas of high reinforcement density require it for placement and consolidation. Refer to CBC 1905A.10.1.
10. Frozen aggregates shall not be permitted.

C. Water: ASTM C 94. Clean, and free from injurious amounts of oil, acids, alkali, salts, organic material, or other deleterious materials.

D. Supplementary Cementitious Material

1. Fly Ash:
   a. ASTM C 618, Class F.
   b. Shall not be used unless part of an approved mix design.
   c. Limit Loss on Ignition to 2.5%

2. Ground Granulated Blast-furnace Slag (GGBFS)
   a. ASTM C 989 Grade 100 or Grade 120.
   b. Shall not be used unless part of an approved mix design.

3. Limit the maximum content of supplementary cementitious materials for concrete exposed to deicing chemicals to values shown in ACI 318, Table 4.2.3

4. The exact percentages used shall be based on successful test placement on site. Resubmit mix design if percentages change based on test placement.

5. The fly ash or natural pozzolan supplier shall have an effective quality control program in place to guard against contamination of the fly ash and assure compliance with specifications.

6. Fly ash and GGBFS used shall be from one source throughout the project. Substitution of sources will be acceptable only if testing of concrete mixes containing the substituted material show similar test results and if the color of concrete produced with the substituted material matches the color of previously poured concrete to the satisfaction of the Architect.

E. Ready Mixed Concrete:

1. Shall be batch-mixed and transported in accordance with ASTM C 94.

2.2 CONCRETE MIX DESIGN

A. Concrete Strength:

1. Shall be as indicated on the Structural Drawings

2. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed.
B. Concrete Density (Unit Weight):

1. Shall be as indicated on the Structural Drawings.

C. Air Entrainment

1. For concrete exposed to freeze/thaw cycles or deicing chemicals, and concrete intended to be watertight, provide entrained air content of 6% ± 1.5%, unless specified otherwise. This includes, but is not limited to, concrete at the following locations:
   a. Concrete at the exterior of the structure with at least one surface exposed to weather, such as exterior face of grade beams and foundation walls.
   b. Ramps and loading docks.

2. Entrained air content noted above shall occur at point of delivery.

3. No entrained air content is required in concrete placed in the foundation with no surface exposed to weather.

4. All interior steel trowel finished, normalweight slabs shall have a maximum air content of 3%.

D. Water-Cementitious Materials (W/cm) Ratio for Normalweight Concrete

1. Unless lower limits are stated in the contract documents, all concrete exposed to freezing and thawing in moist condition and/or required to be watertight or used in slabs-on-grade shall have a maximum W/cm ratio of 0.45.
   a. Where the above mixes are to be pumped, water-reducing admixture (low- or high-range as required) shall be used.

2. Absent the above conditions, all concrete with required strength of 4000 psi or higher shall have a maximum W/cm ratio of 0.50.

3. The water-cementitious materials ratio shall not exceed values indicated, including any water added to meet specified slump in accordance with the requirements of ASTM C 94.

4. Weight of fly ash or pozzolanic admixtures shall be included with the weight of cementitious materials used to determine the water-cementitious materials ratio.

E. Slump

1. Concrete design mixes shall be proportioned to meet the following slump limitations. Slump should be measured as described in the owner's testing agency responsibilities:
   a. Concrete without high range water-reducing admixture: 4" ±/-1" maximum.
   b. Concrete for drilled piers: 6" ±/-1" maximum.
c. Concrete with high range water-reducing admixture: Concrete slump prior to addition of high range water-reducing admixture shall not exceed 3" for normal weight concrete and 4" for lightweight concrete. After addition of water-reducing admixture, the concrete shall have a maximum slump of 9" unless otherwise approved by the SER.

F. Chloride Ion Content

1. The total water-soluble chloride ion content of the mix including all constituents shall not exceed the limits defined in ACI 318 4.3 unless corrosion inhibiting admixtures are added to the mixture to offset the additional chloride.

2. If the specified level of water-soluble chloride ion content cannot be maintained, appropriate level of corrosion inhibiting admixture shall be added to the mix in accordance with the manufacturer's recommendation to offset the excess amount of chloride at no additional cost to the Owner.

2.3 ADMIXTURES

A. General:

1. Admixtures specified below can be used only when established in the mix design with Design Professionals' prior written approval.

2. Each admixture approved by Design Professionals shall be used in strict compliance with manufacturer's published instructions.

3. Concrete supplier shall certify all admixtures to be compatible with each other. (See Submittals Section in Part 1)

B. Air Entraining Admixture:

1. ASTM C 260

2. Example acceptable product: BASF "MICRO-AIR" or "MB-AE-90"

3. Example acceptable product: W. R. Grace's "Darex Series" or "Daravair Series"

4. Example acceptable product: Euclid Chemical's "AEA – 92 or Air 40".

5. Example acceptable product: Sika Corporation "Sika Air Series" or "Sika AEA Series"

C. Low-Range Water-Reducing Admixture:

1. ASTM C 494, Type A, non-lignin sulfonate.

2. Example acceptable product: BASF "POZZOLITH 220-N"

3. Example acceptable product: Euclid Chemical's "EUCON NW" or "EUCON WR 91"
4. Example acceptable product: W. R. Grace’s “WRDA’ Series or “Zyla” Series

5. Example acceptable product: Sika Corporation “Plastocrete Series”

D. Water-Reducing and Retarding Admixture:

1. ASTM C 494, Type D

2. Example acceptable product: BASF "POZZOLITH 100-XR"

3. Example acceptable product: The Euclid Chemical Company “EUCON RETARDER 75” or “EUCON DS”

4. Example acceptable product: W. R. Grace’s “Daratard 17”

5. Example acceptable product: Sika Corporation “Plastiment Series”

E. Mid-Range Water-Reducing Admixture:

1. ASTM C 494, Type A

2. Example acceptable product: W. R. Grace’s “Daracem” or “Mira” Series

3. Example acceptable product: Sika Corporation “Sikaplast Series”

4. Example acceptable product: Euclid Chemical Company: “Eucon MR” or “Eucon MRX”

F. High-Range Water-Reducing Admixture (Super-plasticizer):

1. ASTM C 494, Type F

2. Example acceptable product: BASF "RHEOBUILD 1000" or “GLENIUM SERIES”

3. Example acceptable product: Euclid Chemical’s “EUCON 37” or “PLASTOL SERIES”

4. Example acceptable product: W. R. Grace’s “Daracem” or “ADVA” Series

5. Example acceptable product: Sika Corporation “Viscocrete Series” or “Sikament Series”

G. High-Range Water-Reducing and Retarding Admixture (Super-plasticizer):

1. ASTM C 494, Type G

2. Example acceptable product: The Euclid Chemical Company “EUCON 537”

3. Example acceptable product: W. R. Grace “Daracem Series” or “Adva Series”

4. Example acceptable product: BASF Rheobuild 561

H. Corrosion Inhibiting Admixtures:
1. ASTM C 494, Type C, 30% ± 2% solution of Calcium Nitrite

2. Example acceptable product: W.R. Grace’s “DCI or DCI-S”

3. Example acceptable product: The Euclid Chemical Company’s “EUCON CIA”

4. Example acceptable product: Sika Chemical “Sika CNI”

I. Shrinkage Reducing Admixtures:

1. ASTM C 157

2. Example acceptable product: W.R. Grace “Eclipse 4500” (for use with air-entrained concrete exposed to freeze/thaw), or “Eclipse Floor 200”

3. Example acceptable product: The Euclid Chemical Company’s “EUCON SRA” or “Conex”

4. Example acceptable product: Sika Corporation “Sika Control 40”

2.4 ADHESIVES

A. Bonding agents and adhesives shall meet the volatile organic compounds (VOC) requirements of CalGreen Section 5.504.4.1.

B. Bonding Agent for Cured Concrete:

1. ASTM C 881 Type I and IV, Grade 3, Class B and C.

2. Example acceptable product: BASF “CONCRESE PASTE (LPL)”, Class C Only

3. Example acceptable product: BASF “CONCRESE LIQUID (LPL)”, Class C Only for bonding topping

4. Example acceptable product: Euclid Chemical’s “EUCO #452 EPOXY SYSTEM”.

5. Example acceptable product: Euclid Chemical’s “DURALCRETE SERIES”.

6. Example acceptable product: Euclid Chemical Company “FLEXOCRETE System” for bonding topping

C. Bonding Agent for Uncured Concrete (existing concrete damp or dry, less than 28 days old, no surface water):

1. ASTM C 881, Type II and V, Grade 2, Class B and C.

2. Example acceptable product: BASF "CONCRESE LIQUID (LPL)”, Class C Only

3. Example acceptable product: Euclid Chemical’s “DURALCRETE SYSTEM”.

4. Example acceptable product: Sika Corporation “Sikadur 32 Hi-Mod”
D. Anti-Corrosive Epoxy Cementitious Bonding Compound and Corrosion Protection of Reinforcement (bonding agent for existing concrete saturated surface dry, no surface water):

1. This adhesive shall be a water-based epoxy/cementitious compound for adhesion and corrosion protection of reinforcing members (20 hour maximum open time).
2. Example acceptable product: Euclid Chemical Company "DURALPREP AC"
3. Example acceptable product: Sika Corporation "ARMATEC 110"

E. Adhesive Between Cured Concrete Elements:

1. ASTM C 881 Type I and IV, Grade 3, Class B and C
2. Example acceptable product: Sika Corporation "Sikadur 31 Hi-Mod Gel (1:1 Mix Ratio)"

2.5 CURING COMPOUNDS AND SEALERS

A. Curing compounds and sealers shall meet the volatile organic compounds (VOC) requirements of CalGreen Section 5.504.4.3.

B. Interaction with finishes:

1. See architectural drawings for finish material applied over concrete.
2. Use only curing and sealer compounds that are compatible with finish material.
3. Manufacturer's certification is required.
4. Where finish material is liquid rubberized asphalt, use only strippable type curing compound.

C. Curing and Sealing Compound (VOC Compliant, 350 g/l ) :

1. ASTM C1315, Type I, Class A and ASTM C 309, Type I, Class A or B
2. Example acceptable product: Euclid Chemical’s "Super Diamond Clear VOX"
3. Example acceptable product: Symons “Kure 1315”
4. Example acceptable product: Sonneborn “Cure & Seal 1515 UV”
5. Example acceptable product: Creteseal “New Pour CS2000”

D. Curing Compound (Strippable):

1. ASTM C 309, Type I, Class A or B
2. Example acceptable product: Euclid Chemical's “Kurez DR VOX” (Dissipating) or “Kurez RC” in combination with “KUREZ RC-Off”.

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2.6 SEALERS

A. Sealers shall meet the volatile organic compounds (VOC) requirements of CalGreen Section 5.504.4.3.

B. Surface Sealer:

1. ASTM C 309, Type I, Class A or B, no stearates, no darkening or change of color allowed.

2. Example acceptable product: Euclid Chemical’s “DIAMOND CLEAR VOX”

3. Example acceptable product: Sonneborn “Kure-N-Seal W”

4. Example acceptable product: Symons “Spec-Cure C309”

C. Liquid Densifier/Sealer:

1. The liquid densifier compound shall be a silicate based sealer which penetrates concrete surfaces, increases abrasion resistance and provides a “low-sheen” surface that is easy to clean and eases the problem of tire mark removal. The compound must contain a minimum solids content of 20% of which 50% is silicate. No stearates, no darkening or change of color.

2. Example acceptable product: The Euclid Chemical Company “Euco Diamond Hard”

3. Example acceptable product: Sonneborn “Kure-N-Harden”


2.7 MISCELLANEOUS CONCRETE PRODUCTS

A. Nonshrink Grout

1. Provide pre-packaged natural aggregate grout, high-precision, nonshrink, ready-to-use, complying with the following requirements:

   a. Grout minimum compressive strength shall be 6500 psi.

   b. Grout shall conform to ASTM C 1107, Grade B

2. All material used including water, mixer and pre-packaged grout must be initially at the 45°F and 90°F limits when testing is initiated.

3. Example acceptable product: BASF "MASTERFLOW 928"

4. Example acceptable product: Euclid Chemical’s “HI-FLOW GROUT”

5. Example acceptable product: Five Star Products “Five Star Grout”
6. Example acceptable product: Sika Chemicals "Sikagrout 328"

B. Self-Leveling Concrete Topping - Underlayment for Interior Applications:

1. Use self-leveling underlayment concrete formulated to level concrete floors without shrinking, cracking or spalling, and capable of being placed from feathered edge to 1" thickness without aggregate in one pour. If greater than 1" thickness is required, aggregate shall be used in accordance with manufacturer's requirements. Appropriate primer shall be utilized for all underlayment applications.

2. Example acceptable product: Ardex Engineered Cements "ARDEX K-15"

3. Example acceptable product: Euclid Chemical's "Flo-Top or Super Flo-Top"

4. Example acceptable product: Sika Corporation "Sika Level Series"

2.8 MISCELLANEOUS PRODUCTS

A. Evaporation Retarder:

1. Example acceptable product: BASF "CONFILM"

2. Example acceptable product: Euclid Chemical "Eucobar"

3. Example acceptable product: Sika Corporation "Sika Film"

B. Moisture-Retaining Covers:

Conforming to ASTM C171. A naturally colored, non-woven polypropylene fabric with a 4-mil non-perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention and be fungus resistant.

1. Hydracure S-16 by PNA Construction Technologies, Inc., Matthews, NC

2. Transguard 4000 by Reef Industries (Armorlon Division), Incorporated, Houston TX

C. Sand Cushion: Clean, manufactured or natural sand.

D. Structural Polystyrene used as formwork only.

1. Material: Extruded polystyrene foam insulation board.

2. Comply with the requirements of ASTM C 578, Type IV.

3. Compressive strength, 25 psi at 0.1-inch deformation when tested in accordance with ASTM D 1621.

4. Flexural strength, 50 psi, ASTM C 203.
5. Thickness as indicated on drawings.

6. Example acceptable product: Styrofoam Deckmate Plus, The Dow Chemical Company

E. Vapor Retarder: See Division 7, Thermal and Moisture Protection

1. Minimum 15-mil thick polyolefin geomembrane

2. Manufactured with prime virgin resins

3. Water Vapor Retarder: ASTM E 1745, meets or exceeds Class A

4. Water Vapor Transmission Rate: ASTM E 96, 0.008 gr./ft²/hr. or lower

5. Permeance Rating: ASTM E 96, 0.03 Perms or lower for new material and after conditioning tests in accordance with applicable sections of ASTM E 154

6. Puncture Resistance: ASTM E 1745, minimum 2400 grams

7. Tensile Strength: ASTM E 1745, minimum 45.0 lbs./in.

8. Example acceptable product: W.R. Grace’s “Florprufe 120”


11. Example acceptable product: Raven Industries, “Raven Vapor Block 15”.

F. Non-Slip Aggregate:

1. Abrasive aggregate shall be composed of an aluminum oxide abrasive bonded by a vitreous ceramic material. Use hard, homogeneous, non-glazing, rustproof aggregate which is unaffected by moisture or cleaning compounds.

2. Example acceptable product: Euclid Chemical Company “NON-SLIP AGGREGATE”

3. Example acceptable product: “Alundum” by North Company


5. Example acceptable product: Anti-Hydro International “A-H Alox” by Anti-Hydro International Abrasive

G. Semi Rigid Joint Filler:

1. Example acceptable product: Euclid Chemical “Euco 700”

2. Example acceptable product: Euclid Chemical “Euco QWIKjoint 200”
3. Example acceptable product: Sika Chemical Corporation “Sikadur 51 SL”

4. Example acceptable product: W.R. Meadows Sealtight “Rezi-Weld Flex”

2.9 CONCRETE REPAIR MATERIALS

A. Polymer Repair Mortar

1. The following patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Design Professionals is required.

2. Example acceptable products (Horizontal Repairs): “Thin Top Supreme or Tammspatch II” by Euclid Chemical Company (for 1/16” to 3/8” thickness), or “Concrete Top Supreme” (for 3/8” to 2” thickness).

3. Example acceptable products (Horizontal Repairs): “Sikatop 121 Plus” or “Sikatop 122 Plus” by Sika Chemical Corporation.

4. Example acceptable products (Vertical and Overhead Repairs): Verticoat, Verticoat Supreme, or Duraltop gel by Euclid Chemical Corporation

5. Example acceptable products (Vertical and Overhead Repairs): Chemical Corporation’s, “Sikatop 123 Plus” by Sika Chemical Corporation.

6. Example acceptable products: Degussa’s, “EMACO R” Series.

B. High Strength Flowing Repair Mortar

1. For forming and pouring structural members, or large horizontal repairs, provide the flowable one-part, high strength microsilica modified repair mortar with 3/8” aggregate.

2. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.

3. Prior approval by the Design Professionals is required for cold weather applications

4. Example acceptable product: The Euclid Chemical Company’s, “Eucocrete”

5. Example acceptable product: Degussa’s, “EMACO S” Series.

6. Example acceptable product: Sika Corporation “Sika Repair 211 SCC Plus”

C. Sealant:

1. Silicone or Polyurethane Sealant (as selected based on project requirements such as loading, traffic, bond, coatings, etc.).

2. Sealant shall meet the volatile organic compounds (VOC) requirements of CalGreen Section 5.504.4.1.
3. Joint to be routed and cleaned per manufacturer's written directions.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting. Verify conveying equipment is clean and properly operating.

2. Confirm that the Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.

3. Protect finished surfaces adjacent to concrete-receiving places.

4. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.

B. Subgrade:

1. Dampen subgrades not covered with membrane by sprinkling immediately before placing concrete. Do not saturate.
   a. Omit when subgrade is already damp.

2. Do not place on water-saturated subgrade unless placing can be done without damage to subgrade (surface is stable) and loading the subgrade does not drive free water to the surface.

3. Do not place concrete on frozen ground.

4. Verify depths of depressed slab conditions are correct for delayed finish noted and for proper bonding to concrete.

C. Forms:

1. Coordinate with Section 03 10 00 Concrete Formwork.

2. Verify that construction of formwork is complete and form ties at construction joints are tight.

3. Remove dirt, sawdust, nails and other foreign material from formed space.

4. Dampen wood forms by sprinkling immediately before placing.

5. Cool metal forms by sprinkling immediately before placing.

D. Concrete Accessories:

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1. Coordinate with Section 03 10 00 Concrete Formwork.

2. Ensure required reinforcement, inserts, and embedded items are in place.

E. Dewatering:

1. Remove water from concrete formwork.

2. Divert any flowing water to sump and remove by pumping.

3. Refer to Division 1 for additional dewatering requirements.

F. Vapor Retarder Placement: See Division 7, Thermal and Moisture Protection.

1. Vapor retarder installation shall be in accordance with manufacturer’s instructions and ASTM E 1643.

2. Place vapor retarder under slabs-on-grade in position with longest dimension parallel with direction of pour.

3. Joints: Lap 6" minimum and seal with manufacturer’s recommended mastic or pressure-sensitive tape.

4. Prevent damage to moisture barrier.

5. If moisture barrier is damaged, place a piece of moisture barrier over damaged area (6" larger all around) and tape in place with type of tape recommended by moisture barrier manufacturer.

6. Seal laps and intersections of walls with compatible trowel mastic or pressure-sensitive sealing tape.

7. Seal around pipes and other penetrations with compatible trowel mastic.

8. The vapor barrier must be approved prior to concrete placement.

3.2 JOINTS IN CONCRETE

A. Locate construction and contraction joints as indicated on Drawings and on approved joint location submittal.

1. Do not use contraction joints in framed floors or composite slabs.

2. Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Design Professionals.

3. Coordinate location of construction and contraction joints with locations of joints in finish materials where they exist.

   a. Construction and contraction joints in slabs or slab on grade with terrazzo finish must be reviewed and approved by the Design Professionals.

B. Construction Joints:

1. Construction joints shall be located within the central third of the span. Any concrete spilling over or through the bulkhead shall be removed at the completion of the pour. All surfaces of the concrete shall have reinforcing extending through the joint.

2. Horizontal Joints: Horizontal construction joints other than those shown on the drawings will not be permitted unless approved by the Architect.

3. Joint Preparation: Forms shall be removed in time to permit roughening of construction joints of structural members by chipping and wire brushing to remove all loose and foreign material. The existing concrete at joints shall either be (a) dampened to the point that the surface is saturated, but all standing water has been removed, promptly followed by placement and vibration of fresh concrete, or (b) not required to be dampened, with one of the specified bonding compounds applied as appropriate for the joint condition, following manufacturer recommendations, with placement and vibration of fresh concrete to follow while the epoxy bonding agent is still tacky. Joints without epoxy bonding agent require fresh concrete with slump 7 inches or greater at horizontal joints, and fresh concrete confined to maintain pressure against the joint at vertical joints. Where such conditions are not present, or where applying water to dampen the surface is impractical, use epoxy bonding agent suitable for dry surfaces.

C. Isolation Joints:

1. Interrupt structural continuity resulting from bond, reinforcement or keyway at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls and other locations, as indicated.

D. Contraction (Control) Joints in interior Floor Slabs-on-Grade:

1. Space joints at 36 times slab thickness unless a smaller spacing is indicated on the Drawings, located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

2. Maximum slab area controlled by jointing is 400 square feet.

3. Contraction joints can be provided by sawcuts 1/8" by ¼ slab depth, formed joints, hand-tooled joints, or appropriately detailed construction joints.

4. Sawcuts shall be made as soon as possible after slab finishing as may be safely done without dislodging aggregate or breaking edges. The Soff-Cut saw shall be used to a depth of ¾ of slab thickness immediately after final finishing. Conventional saw shall be used as soon as possible after final finish without raveling to a depth as indicated on the drawings.

5. Where contraction joints coincide with construction joints, detail joint as indicated on drawings.
E. Joint Fillers: Coordinate with Section 03 20 00 Concrete Reinforcement and Embedded Assemblies and Division 7 requirements.

3.3 MIXING

A. Measurement of Materials: Conforming to ASTM C 94

B. Mixing: All concrete shall be ready-mixed conforming to ASTM C 94 except as follows:

1. Provide concrete materials, proportions and properties as herein specified in lieu of ASTM C 94.
2. Method of mixing shall comply with CBC Section 1905A.8.
3. Adjust grading to improve workability; do not add water at batch plant unless otherwise directed.
4. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
5. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
6. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.
7. Water, beyond that required by the mix design, shall not be added at the Project site. Addition of water at the Project site shall be made only in the presence of the Owner's Testing Agency.
8. Furnish delivery ticket with each load of concrete delivered to the site to the Contractor conforming to the requirements of ASTM C 94.
9. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C 94.

C. High range water reducing agents (superplasticizer), if added at the batch plant, may be added again at the Project site.

1. If superplasticizers are added at the batch plant, the concrete mix design must account for the delivery time, workability, finishability, and setting time required on the jobsite for proper placing and finishing procedures.
2. If the superplasticizer is redosed at the jobsite in air entrained concrete, air content must be checked after mixing.

D. Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates.
3.4 CONCRETE PLACEMENT

A. Prior to Concrete Placement:

1. Mechanical vibrators are required and must be available for placing concrete. Ensure availability of spare vibrators in case of failures.

2. Place no concrete where weather conditions prevent proper finishing and curing.

3. Remove debris from space to be occupied with concrete.

4. Notify Design Professionals and DSA and Owner's Testing Agency 48 hours prior to starting concrete placement.

5. Approved mix designs must be maintained on file in Contractor's Field Office.

6. Reinforcement and accessories shall be in proper locations, clean, free of loose scale, dirt or other foreign coatings that may reduce bond to concrete, and in accordance with Section 03 20 00 and Drawings.

7. Fog spray forms, reinforcing steel, and subgrade just before pouring concrete.

8. Do not place concrete having a slump outside of allowable slump range.

9. Place concrete before initial set has occurred, but in no event after it has been discharged from the mixer more than 30 minutes. All concrete shall be placed upon clean, damp surfaces, free from puddled water, or upon properly consolidated fills, undisturbed soil or controlled low-strength material with a minimum strength of 1200 psi. Placement upon soft mud or dry earth is not permitted.

10. Unless adequate protection is provided, concrete shall not be placed during rain.

11. Rain water shall not be allowed to increase mixing water or to damage the surface finish.

12. Do not use equipment in placing and finishing concrete that contain aluminum in the finishing edges that come in contact with the concrete surface.

13. Keep subgrade moisture uniform without puddles or dry areas.

14. Place vapor retarder directly below slabs on grade as specified in contract documents.

B. For Conduits and Pipes Embedded in Concrete:

1. For concrete slab, wall, beam or column, conform to requirements of ACI 318, Chapter 6. For variations from these requirements, submit a written request for Design Professionals' review and response.

2. Conduits and pipes shall not be embedded in concrete slabs on steel deck without approval of Design Professional.
3. Provide sleeves for pipes passing vertically through concrete.

4. Do not embed aluminum materials.

5. Do not cut, bend or displace the reinforcement to facilitate placement of embedded pipes and conduits.

C. Pumping: Pumping shall be done in strict accordance with ACI 304.2R.

1. The Contractor shall demonstrate that the pumping equipment has a record of satisfactory performance under similar conditions and using a similar mix.

D. Placing Concrete in Forms:

1. Clean and prepare forms as specified in Section 03 10 00/Concrete Formwork.

2. Place concrete continuously without interruption between predetermined construction and contraction joints in walls.

3. Deposit concrete in forms in horizontal layers no deeper than 24" and in a manner to avoid inclined construction joints. Level top surface upon stopping work.

4. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

5. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.

6. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping.
   a. Use equipment and procedures for consolidation of concrete in accordance with ACI 309R.

7. Do not use vibrators to move fresh concrete laterally inside forms from discharge point; shift discharge point as needed.

8. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine to achieve timely consolidation around reinforcement, embedded items and into corners of forms.

9. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer.

10. Do not insert vibrators into lower layers of concrete that have begun to set.

11. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

12. Employ concrete mix with smaller aggregates as required by CBC 1905A.10.1.
E. Placing Concrete Slabs:

1. Place concrete continuously without interruption between predetermined construction and contraction joints in floors.
   
a. Place slabs on grade by the long strip cast method. Refer to ACI 302.1R for recommended methods of placement.

2. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section. Employ mechanical vibrating equipment in accordance with ACI 309R as required to achieve thorough consolidation.

3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.

4. Bring slab surfaces to correct level with a straightedge and strike off.
   
a. Use highway straight edges, bullfloats or darbies to smooth surface free of humps or hollows.

b. Do not disturb slab surfaces prior to beginning finishing operations.

5. Maintain reinforcing in proper position on chairs during concrete placement.

6. Do not place materials on slabs or impose loads during period of setting.

7. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.

F. Placing Concrete at Construction Joints:

1. To secure full bond at construction joints, surfaces to receive concrete in a subsequent placement shall be left in a roughened state or intentionally roughened by raking while plastic or brushing and chipping immediately after removal.

2. Before new concrete is placed in contact, surfaces of hardened concrete already placed shall be thoroughly cleaned of foreign materials and laitance.

3. At hardened concrete at joints where no bonding agents are used, dampen concrete to achieve a saturated surface dry condition. Leave no standing water. Place and vibrate concrete (slump 7 inches or greater) against horizontal joints. Place and vibrate flowing concrete (slump 8 to 10 inches) while maintaining pressure against vertical joints by confinement.

4. At hardened concrete with joints not meeting conditions required for no bonding agents, apply appropriate specified bonding agent for conditions present including age and moisture per manufacturer’s specifications. Place new concrete while the bonding agent is still tacky.
G. Cold-Weather Placement:

1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306R and as specified in this section.

2. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F, and not more than 80°F, at point of placement.

3. Do not use frozen materials or materials containing ice or snow.
   
a. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

4. Remove frost, snow and ice from forms, reinforcement and other embedments immediately prior to concrete placement.

5. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

6. Use only the specified non-corrosive accelerating admixture previously approved as part of the cold weather mixture. Addition of calcium chloride, salt, thiocyanates or admixtures containing more than 0.05 percent chloride ions is not permitted.

H. Hot-Weather Placement:

1. Hot weather is defined as air temperature at the time of delivery, protection and curing which exceeds 90°F or any combination of high temperature, low humidity and/or high wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour as determined by ACI 305R.

2. When hot weather conditions exist, place concrete in compliance with ACI 305R and as specified in this section.

3. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C).

4. Mixing water may be chilled, or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.

5. Use of liquid nitrogen to cool concrete is Contractor's option.

6. When concrete placement will occur late in the day and reinforcing steel will be heated by the sun, cover reinforcing steel with water-soaked burlap so that steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
7. When concrete operations must be performed in direct sun, wind, high temperatures, low relative humidity, or other adverse placing conditions, the specified evaporation retarder shall be applied one or more times during the finishing operation to prevent plastic cracking.

3.5 CONCRETE FINISHES

A. General:

1. Comply with recommendations for concrete finishing established by ACI 302.1R and ACI 304R.

2. Comply with dimensional tolerance limitations given by ACI 117 except as modified in the Construction Documents.

3. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.

4. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

5. Where fiber reinforcement is used, remove exposed fibers from concrete surface to the satisfaction of the Architect.

6. For shored floor or slab on grade construction: Floor flatness/floor levelness tolerance compliance testing is to be performed prior to the removal of shores and forms but not later than 72 hours of concrete placement by Owner’s Testing Agency.

7. See architectural drawings for locations of the various finishes listed below.

8. Comply with slab \( F_F \) and \( F_L \) values specified below:

   a. If an individual test section measures less than either of the specified minimum local \( F_F \)/\( F_L \) numbers, that section may be rejected and remedial measures may be required as specified in CONCRETE SURFACE REPAIRS.

   b. If the composite value of the test surface measures less than either of the specified overall \( F_F \)/\( F_L \) numbers, then the entire slab may be rejected and remedial measures may be required.

   c. \( F_L \) numbers shall not apply to unshored slabs or shored slabs with camber.

B. Finish for monolithic slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, sand-bed terrazzo as indicated on architectural drawings:

1. Float Finish.

   a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
b. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.

c. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.

d. Finish surfaces to overall value of $F_F = 20$ and $F_L = 15$ and minimum local value of $F_F = 14$ and $F_L = 10$ measured according to ASTM E 1155.

e. Cut down high spots and fill low spots.

f. Uniformly slope surfaces to drains.

g. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Finishes for Pedestrian Sidewalks and Ramps, Exterior Platforms, Steps, as indicated on architectural drawings:

1. Sidewalks and Curbs: Equivalent to-medium broom finish applied with fiber-bristle broom perpendicular to direction of main traffic route immediately after float finishing.

2. Ramps: Scored finish as applied perpendicular to direction of main traffic route immediately after float finishing. Providing non-slip finish.

3. Finish surface to overall value of $F_F = 20$ and $F_L = 15$ and minimum local value of $F_F = 14$ and $F_L = 10$ measured according to ASTM E 1155.

4. Texture shall be approved by the Design Professionals from sample panels.

D. Finish for interior floor slab and stair surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile on thick-set mortar, paint or another thin film-finish coating system, as indicated on architectural drawings:

1. Trowel Finish.

   a. After floating, begin first trowel-finish operation using a power-driven trowel.

   b. Begin final troweling when surface produces a ringing sound as trowel is moved over surface.

   c. The final hand-troweling operation shall result in a smooth surface, free of trowel marks, uniform in texture and appearance.

   d. Grind smooth any surface defects that would telegraph through applied floor covering system.

2. Finish surface to overall value of $F_F = 25$ and $F_L = 20$ and minimum local value of $F_F = 17$ and $F_L = 14$ measured according to ASTM E 1155.
3. **Floor Slopes**: Where drains occur, slope floor slabs uniformly to drains, maintaining scheduled slab thickness.

4. **Floor Edges at Expansion Joints**: Tool edges minimum 3/8".

5. **Defects**: Remove defects of sufficient magnitude to show through floor covering by grinding.

6. **Floor Hardener**: Use only where scheduled and in accordance with manufacturer's published instructions.

7. **Dry Cement**: Shall not be used during finishing.

**E. Tolerances at Slab Discontinuities**

Within 2 ft of slab boundaries, construction joints, isolation joints, block-outs, penetrations or other similar discontinuities, where required for travel paths, installation of finishes and partitions, or any other requirements indicated in the contract documents, the following equivalent straightedge tolerances shall apply:

- Specified local $F_r = 14$, use 3/8" over 4 ft, no offset greater than 1/16"
- Specified local $F_r = 20$, use 1/8" over 4 ft, no offset greater than 1/32"

**F. Dry Shake Finish**:

1. Non-slip aggregate where indicated on drawings.

2. Non-oxidizing metallic hardener on loading docks at a rate of 1.5 lbs. per sq. ft. and in other locations so noted on the drawings.

3. Mineral aggregate hardener at a rate of 1.2 lbs. per sq. ft. where noted on the drawings.

4. Final finish type, method and tolerance as applicable by location and use.

5. Dry shake finish will be applied only where scheduled and in accordance with the manufacturer's published instructions and the methods and procedures agreed upon at the pre-installation conference.

**G. Rough Formed Finish**:

1. Acceptable for formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated.

2. Concrete surface shall have texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4" in height rubber down or chipped off.

**H. Smooth Formed Finish**:

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Cast-In-Place Concrete
1. Required for formed concrete surfaces exposed to view, or scheduled to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system, as indicated on architectural drawings:

2. Surface is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

3. Repair and patch tie holes and defects. Remove fins and other projections completely.

I. Smooth Rubbed Finish:

1. "Smooth Rubbed" finish shall consist of a finish free of fins, joint marks smoothed off, blemishes removed and surfaces left smooth and unmarred.

2. Provide smooth rubbed finish to scheduled concrete surfaces, as indicated on architectural drawings, which have received smooth form finish treatment not later than one day after form removal.

3. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced.

   a. Do not apply cement grout other than that created by the rubbing process.

J. Grout-Cleaned Finish:

1. Provide grout-cleaned finish on scheduled concrete surfaces, as indicated on architectural drawings, that have received smooth-formed finish treatment.

2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint.

3. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

4. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes.

5. Remove excess grout by scraping and rubbing with clean burlap.

6. Keep surface damp by fog spray for at least 36 hours after rubbing.

K. Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.

2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
3.6 CURING AND PROTECTION

A. Normal Conditions:

1. Protect concrete from premature drying, excessive hot or cold temperature, and damage.

2. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.

3. Concrete shall be kept continuously moist and above 50°F (10°C) for seven days (ASTM C 150 Type I cement) or for 10 days (ASTM C 150 Type II cement). High early strength concrete usage shall be maintained over 50°F (10°C) for three days.

4. The architect may recommend longer periods based on temperature, wind and humidity conditions.

5. Concrete and concrete patching materials shall be cured according to manufacturers published recommendations.

6. Begin curing as soon as free water has disappeared from concrete surface and finishing has been completed.

7. Comply with CBC Section 1905A.11.

8. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.

9. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

   a. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

      i) Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Curing compound should be applied at upper end of manufacturer's range of application.

      ii) Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.

      iii) Recoat areas subjected to heavy rainfall within 3 hours after initial application.

      iv) Maintain continuity of coating and repair damage during curing period.

      v) Use curing and sealing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
vi) Floors to receive covering shall be cleaned thoroughly using a power scrubber and industrial strength detergent.

vii) Hand-brooming and sweeping is not sufficient.

viii) Strippable curing compound may be used in lieu of a moist curing method when approved by the Design Professionals.

b. Provide moist curing by the following methods:

i) Keep concrete surface continuously wet by covering with water.

ii) Use continuous water-fog spray.

iii) Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4" lap over adjacent absorptive covers.

c. Provide moisture-retaining cover curing as follows:

i) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period using cover material and waterproof tape

10. Cure slabs on grade, concrete toppings, concrete pour strips, supported slabs, walls and columns, not subject to conditions of hot or cold weather concreting, in accordance with ACI 308.

11. Cure surfaces exposed to deicing salts, brackish water, etc., such as loading dock slabs, parking garage slabs and ramps in accordance with ACI 308 recommendations for moist curing.

12. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed.

a. If forms are removed, continue curing by methods specified above, as applicable.

B. Cold-Weather Protection:

1. When concrete is placed under conditions of cold weather concreting (defined as a period when the mean daily temperature drops below 40°F for more than 3 successive days), take additional precautions as specified in ACI 306R when placing, curing, monitoring and protecting the fresh concrete.
C. Hot-Weather Protection:

1. When concrete is placed under conditions of hot weather concreting, provide extra protection of the concrete against excessive placement temperatures and excessive drying throughout the placing and curing operations with an evaporation retarder.
   a. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

2. Hot weather curing is required if hot weather conditions occur within a 24-hour period after completion of concrete placement.

D. Floor surfaces, wherever indicated by weather conditions, shall be sprinkled during the interval between finishing operation and the start of curing to positively ensure against the possibility of surface drying.

3.7 CONCRETE REPAIRS

A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.

B. Perform patching and repairs in accordance with ACI 301.

C. Contractor shall submit patching and repair methods and materials for review by Design Professionals.

D. When complete, all patches and repairs shall match color and texture of adjoining surfaces.

E. At surfaces that are exposed to view, prepare test areas at inconspicuous locations for review by design professionals to verify repair color and texture match before proceeding with repair.

F. Apply all patching and repair materials in accordance with manufacturer's specifications.

G. Repairing Cracks In Formed and Unformed Surfaces:

   1. Contractor shall notify Design Professionals of all cracks wider than 0.02" (0.50mm) and all cracks wider than 0.01" (0.25mm) that occur in a group of at least three cracks within twelve inches (300mm), in concrete. If Design Professionals deem repairs necessary, Contractor shall be responsible for repairing all such cracks per Design Professionals recommendation at no expense to the Owner. Repairs will generally require one or more of the following: Epoxy Injection, Semi-Rigid Epoxy, Pressure Injected Foam Resin, Methyl Methacrylate and/or Sealant with joint routed and cleaned. See Concrete Repair Materials section of this Specification for acceptable products.

H. Repairing Formed Surfaces
1. Immediately after stripping forms, patch all honeycombing, defective joints, voids, etc. before the concrete is thoroughly dry.

2. Remove all burrs, fins, and ridges before the concrete is thoroughly dry.

3. Remove stains from rust, grease and oils, from release agents, etc.

4. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Design Professionals.
   a. Surface defects, include color and texture irregularities, cracks as defined above, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   b. Chip away defective areas, honeycomb, rock pockets, voids over 1/4" (6mm) in any dimension and holes left by tie rods and bolts, down to solid concrete but in no case to a depth less than 1" (25mm) and saw-cut edges to prevent feather edging of fill material.

5. Repair concealed formed surfaces, where possible, containing defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

6. Clean out form tie holes and fill with dry pack mortar or precast cone plugs secured in place with bonding agent.

7. If honeycombing exposes reinforcement, chip to provide clear space at least 3/4" (20mm) wide all around steel to allow proper bond.

1. Repairing Unformed Surfaces:

1. High and Low areas in concrete surfaces which are in excess of specified tolerances shall be leveled or ground-smooth.
   a. Correct high areas by grinding after concrete has cured at least 14 days.
   b. Correct low areas by applying leveling material. Finish leveling material as specified in this section.

2. Repair surfaces containing defects that affect durability of concrete.
   a. Surface defects include crazing, cracks as defined above, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

3. Repair defective areas, except random cracks and single holes not exceeding 1" (25mm) in diameter, by cutting out and replacing with fresh concrete.
   a. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4" (20mm) clearance all around.
J. Filling in: Fill in holes and openings left in concrete for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place.

3.8 EVALUATION AND ACCEPTANCE OF CONCRETE

A. In accordance with ACI 301, except where otherwise specified.

B. If, at any time during construction, the concrete resulting from the approved mix design deviates from Specification requirements for any reason, such as lack of workability, or insufficient strength, the contractor shall have his laboratory verify the deficiency and modify the mix design, until the specified concrete is obtained. Modified mix to be submitted for approval per Part 1 - SUBMITTALS.

3.9 COORDINATION & CORRECTIVE MEASURES

A. Conflicts: The contractor shall be solely responsible for errors of detailing, fabrication, and placement of reinforcement steel; placement of inserts and other embedded items; and the structural adequacy of all formwork.

B. Reimbursement for Additional Services: Should additional work and/or visits be required which are necessitated by failure of the Contractor to perform his work in accordance with the contract documents, or if additional design or drafting time is required for corrective measures caused by failure to perform in accordance with the contract documents, the Contractor shall reimburse the Architect and Engineer at the rate of direct personnel expense plus 150% overhead plus out-of-pocket traveling expenses incurred.

3.10 CLEAN UP

A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION
Structural Substitution Request Form – to be completed by Contractor

<table>
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<tr>
<th>Project:</th>
<th>Substitution Request #</th>
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<td>Date:</td>
<td>Pages Attached (including this form)</td>
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1. Description of Requested Substitution:

2. Related Drawings and Specification Sections:

3. Rationale or Benefit Anticipated:

4. Effect on Construction Schedule\(^1\) (check one):  
   - \(\square\) NONE  
   - \(\square\) See Attached

5. Effect on Owner’s Cost\(^2\) attach data (check one):  
   - \(\square\) CREDIT TO OWNER  
   - \(\square\) EXTRA

6. Effect on Construction Documents\(^3\) (design work anticipated):  
   - \(\square\) NONE  
   - \(\square\) See Attached

7. Requesting Contractor Agrees to Pay for Design Changes (check):  
   - \(\square\) YES  
   - \(\square\) NO  
   - \(\square\) NOT APPLICABLE

8. Effect on Other Trades\(^4\):

9. Effect of Substitution on Manufacturer’s Warranty (check):  
   - \(\square\) NONE  
   - \(\square\) See Attachment

Signature\(^5\):  
Company:  
General Contractor Signature\(^5\):  
Date:

**Notes:**

1. Contractor is responsible for means and methods and any problems that may arise from making the requested substitution.

2. This is **NOT A CHANGE ORDER FORM**. A separate form is required to adjust costs and/or schedules.

3. Contractor is responsible for any design impacts that may arise from this substitution, including redesign efforts.

4. Contractor is responsible for effects on other trades from this substitution; General Contractor must review and agree effects on other trades are fairly represented in items 4-9.

5. Signature by a person having authority to legally bind his/her company to the above terms.
   Otherwise this request is void

6. All items in form must be completed for substitution request to be considered.
### Request Review Responses (completed by Architect and/or Engineer(s)):

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<th>ACCEPTED AS NOTED</th>
<th>REJECTED</th>
<th>INSUFFICIENT DATA TO SUPPORT REQUEST</th>
<th>ENGINEER / ARCH / MEP SIGNATURE</th>
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Engineer/Architects Comments:
SECTION 051200
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 GENERAL

Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

The work covered by this Section shall include all labor, material, equipment, permits, engineering and other services necessary for the fabrication and installation of structural steel and related work, complete, in accordance with the Drawings and as specified herein. For structural steel related to the Seismic Force Resisting System, see Section 051210.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

Submittals Division 1
Quality Control Division 1
Concrete Reinforcement and Embedded Assemblies Section 032000
Cast-In-Place Concrete Section 033000
Structural Steel-Additional Seismic Requirements Section 051210
Metal Fabrication Section 055000
Painting Division 9

1.4 CODES AND STANDARDS

A. Building Code: Structural steel work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.

B. Standards:

1. American Institute of Steel Construction (ANSI/AISC 360-10) "Specification for Structural Steel Buildings"

a. In item 3.1.2 delete all references to item 4.4 and replace with the requirements of the project Specification.

b. Item 3.6 shall be deleted.

c. Item 4.4 shall be deleted, and replaced with the requirements of the project Specification.

d. The second paragraph of item 7.10.3 shall be revised from "... owner's designated representatives for design and construction" to "owner's designated representative for construction or as indicated in the Contract Documents"

e. The last sentence of items 8.5.2 and 8.5.4 shall be deleted.

f. Item 8.5.3 shall be deleted. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.


C. Definitions:

1. The term “Contract Documents” in this Specification is defined as the design Drawings and the Specifications.

2. The term “SER” in this Specification is defined as the Structural Engineer of Record for the structure in its final condition.

3. The term “Design Professionals” in this Specification is defined as the Owner’s Architect and SER.

4. The term “Contractor” in this Specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Structural Steel Fabricator or Structural Steel Erector.

5. The term “Heavy Shapes” in this Specification is defined to include hot rolled steel shapes with flanges exceeding 2 inches (50mm) in thickness and built up cross sections with plates exceeding 2 inches (50mm) in total thickness.
6. The term “High Restraint Weld” describes welds in which there is almost no freedom of movement for members joined due to geometry or material thickness.

7. The term “Testing Agency” in this Specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of steel construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.

8. The terms “for record” and “submit for record” in this Specification are defined as Contractor submittals that do not require a response from the Design Professionals.

9. Working Days: Monday through Friday, except for federal or state holidays.

10. Nondestructive Testing: Nondestructive testing (NDT) includes magnetic particle testing (MT), penetrating testing (PT), radiographic testing (RT), and ultrasonic testing (UT). The terms nondestructive examination (NDE) and nondestructive testing (NDT) are synonymous.

1.5 CONTRACTOR QUALIFICATIONS

A. The term Structural Steel Contractor refers to any or all of the following parties, regardless of their contractual relationships: Structural Steel Fabricator, Structural Steel Detailer, Structural Steel Erector and Contractor’s Engineer.

B. Qualification Data: Submit qualification data (personnel and firm resumes, and project lists with references) for the Structural Steel Fabricator (“Fabricator”), Structural Steel Detailer (“Detailer”), Contractor’s Engineer(s) and Structural Steel Erector (“Erector”).

C. The Fabricator shall have 10 years of comparable experience in installations of this type and shall employ labor and supervisory personnel familiar with the type of installation, experienced in fabrication and erection of structural steel for projects of similar size and complexity. At the time of bid the Fabricator shall be AISC certified to the Standard for Steel Building Structures (STD) and must submit proof of these qualifications. The Fabricator’s qualifications shall be subject to review by the Design Professionals and Owner.

D. The Detailer shall have 10 years experience preparing detailed steel shop drawings for structures of this type and complexity. The detailer’s qualifications shall be subject to review by the Design Professionals and Owner.

E. The Contractor’s Engineer(s) shall be qualified to perform the type of work required by the project. The Engineer(s) shall be a Licensed Structural Engineer(s) in California. The Contractor’s Engineer(s) shall have 10 years of experience being in responsible charge of work of this nature. The proposed Engineer(s) shall be subject to approval of Design Professionals and Owner.
F. The Erector shall have 10 years of successful experience erecting structural steel for structures of this type and complexity in the region of the project. At the time of bid the Erector shall be an AISC Certified Steel Erector (CSE) and must submit documentation of this qualification.

G. Welding: Welders shall have a valid Welding Performance Qualification Record (WPQR) for each welding procedure to be performed. Qualify the welding procedures, shop welders, field welders, welding operators and tackers in accordance with AWS D1.1 and for the following periods of effectiveness of certification:

1. Certification and qualification, including period of effectiveness of welding personnel shall be as specified by AWS D1.1. Certification shall remain in effect for duration of work provided welders are continuously engaged in performing the type of welding for which they are certified, unless welders fail to perform acceptable welding, as determined by the Owner’s Testing Agency. Certification and re-certification of welding personnel is subject to verification by the Testing Agency. Re-testing for re-certification will be the Contractor’s responsibility.

1.6 SUBMITTALS

A. Required Submittals - Where the SUBMITTALS section of this Specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.

   (1) Submittal Schedule
   (2) Calculations, Shop Drawings and Erection Drawings
   (3) Pre-construction Survey
   (4) Quality Control Program
   (5) Product Data
   (6) Samples
   (7) Welding Procedures Specification (WPS)
   (8) Welder Certifications
   (9) Mill Reports

1. Submittal Schedule: The contractor shall submit for approval a shop drawing submission schedule at least twenty (20) working days prior to commencing submission of connection design calculations and shop drawings.

   a. This schedule shall include a list, in order of date to be submitted, of all drawings and other required submittal items scheduled to be submitted. The schedule shall list the proposed submittals for each week, including but not limited to the number of erection drawings, and piece drawings, as well as their formats. Once shop drawing submissions have commenced any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place.
b. If at any time the total number of erection drawings and shop drawings received in any one week period exceeds the amount in the approved schedule by more than 10% for that week, the Design Professionals have the right to add two days to the average turnaround time for each 20% increment in excess of the scheduled quantity for that week's submissions. For example if the weekly total exceeds the schedule by 10% to 20%, two days may be added; if it is exceeded by 21% to 40%, four days may be added. The return dates for subsequent submittals may be extended based on the additional review time stated above.

c. For the purposes of developing a schedule, assume the following review rates:

2. Shop drawings – 300 pieces/pages per week

a. Shop Drawings and Erection Drawings (including Field Work drawings): Submit for approval, shop drawings and erection drawings for all structural steel indicated on the Contract Documents.

b. Material shall not be fabricated or delivered before the shop and erection drawings have been approved or approved as noted by the Design Professionals and returned to the Contractor.

c. Structural Steel Shop Drawings: Submitted shop drawings shall include layouts and details for each member showing the steel type and grade, size, connections, cuts, copes, holes, bolts, welds, surface treatments (cleaning, shop paint, etc.) and provisions for the connection of other work. Steel type, grade and size for all attached elements shall also be shown.

d. Shop and erection drawings shall contain complete dimensional and geometric information, based on established dimensions shown on Contract Documents, and shall not be scaled from Contract Documents. The shop drawings shall clearly distinguish between shop and field welds and bolts, identify pretensioned high strength bolts and identify surface preparation requirements at slip critical connections.

e. Welds: All welds shall be indicated by standard welding symbols in the "Standard Code for Arc and Gas Welding in Building Construction" or as accepted by the SER. Shop and erection drawings shall show the size, length, and type of each weld, including the electrode type to be used.

f. Bolts: Details for bolt assemblies shall indicate bolt size, length, type and the presence, type and location of washers where required as part of the assembly; distinguish between N and X bolts, distinguish between slip-critical and bearing bolts; and distinguish between shop and field bolts. Also, indicate bolt orientation where required by the Contract Documents.
g. Erection Drawings: The erection drawings shall include plans showing exact locations of base and bearing plates, and/or anchor rods and other embedded items. All field connections not specifically shown on shop drawings shall be shown on erection drawings, including field bolt size, type, number, location and any special installation requirements, and field weld size, type, length and location.

3. Preconstruction Survey: Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared, survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Design Professionals. For all steel construction, before steel erection commences, perform and submit to the Design Professionals a complete survey for position and alignment at all points where existing construction interfaces with new construction, including but not limited to location of existing gridlines, face of walls and foundations, elevations of existing framing, slabs and foundations, etc. Include plan location positions relative to the building gridlines, and elevations of bearing surfaces and tops of bolts relative to building Datum elevation.

4. Product Data: Submit manufacturers' specifications, test reports and applicable standards for all products listed under Part 2: Products. Standard literature shall be edited to suit job conditions.

5. Samples: Material samples shall be provided as requested by the Owner's Testing Agency.

6. Welding Procedures Specification (WPS): Submit for record written welding procedures for all AWS D1.1 prequalified joints, and qualification procedures for all joints not prequalified by Section 3 of AWS D1.1. Submit supporting Procedure Qualification Record (PQR) as required by AWS D1.1. Submit written welding procedures developed by Contractor's welding consultant for heavy shapes and High Restraint Welds described in this Specification. Use the forms in AWS D1.1, Annex N. Submit weld sequence procedures indicating field welding sequence for each type of connection with multiple field-welded joints, and the sequence of such connections to be filed welded at each level. Where shrinkage is likely to cause distortion or other problems, submit a mitigation plan. Submit all welding and qualification procedures to the Owner's Testing Agency for approval before submitting to the Design Professionals.

7. Welder Certification: Submit for record certification that the welders have passed qualification tests acceptable to the governing authority using AWS procedures.
   a. A certification shall be submitted in standard AWS format.
   b. Each certification shall state that the welder has been doing satisfactory welding of the required type within the six-month period prior to the subject work.
For any welder whose period of certification effectiveness has lapsed or whose workmanship is subject to question in the opinion of the Design Professionals or Testing Agency, immediate testing for recertification will be required. Tests, when required, shall be conducted at the sole expense of the Contractor.

8. Mill Reports: Submit for record certified copies of all mill reports, two (2) to the Design Professionals and one (1) to the Testing Agency, covering the chemical and physical properties of all structural steel and accessories (as defined in this Specification) for the project. Where required on the Contract Documents or by the AISC Code, reports shall include results of Charpy V-notch tests.

a. Such certificates shall be obtained from the mills producing the steel and shall certify in a cover letter submitted with the certificates, that the steel meets the minimum requirements as to physical properties, inspection, marking and tests for structural steel as defined by the current edition of the relevant ASTM Standard Specifications. Any steel that does not meet the ASTM requirements must be clearly identified in a cover letter submitted with the certificates.

b. Prior to commencing steel erection, the contractor shall deliver certificates to the Owner in number and form as may be required by the local Building Department or other local and State agencies having jurisdiction.

1.7 TEMPORARY SUPPORT OF STRUCTURAL STEEL FRAME

The structure as shown on the Contract Documents is designed to withstand the design loads only when all structural elements are installed and fully connected. The contractor shall be responsible for the analysis of all components and assemblies for stresses and displacements that may be imposed by fabrication, shipping, handling, erection, temporary conditions, construction loads, etc. The analysis of such shall be performed by the Contractor’s Engineer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Unload all structural steel promptly upon arrival and store in an area designated and approved by the Owner at the site of the work. The Contractor shall be responsible for any charges from failure to unload material promptly.

B. Storage: Store structural steel to drain properly. Provide weep holes and clean out as required to keep steel free from water. Provide adequate protection and shoring to prevent distortion and other damage. Store structural steel on timber; do not lay on mud, directly on ground or cinders, or otherwise handle in a manner that damages finishes. Stored sections shall be readily accessible for inspection.

C. Store fasteners in a protected place.

D. Welding materials to be in moisture resistant, undamaged package. Maintain packages effectively sealed until electrode is required for use. Storage and handling shall be per AWS D1.1.
1.9 QUALITY ASSURANCE BY OWNER’S TESTING AGENCY

A. Quality assurance is testing and inspection to assist the Owner in evaluating the Contractor's performance in the fabrication shop and field. It is not a substitute for the testing and inspection which is required as part of the Contractor’s quality control program (see the following section on quality control).

B. Cost: Except as specifically noted otherwise, the testing agencies for quality assurance shall be engaged and paid by the Owner.

C. The Owner has negotiated inspection services based upon the assumption that all fabrication work shall be performed at one single fabrication shop. Costs associated with work being performed in additional shops will require reimbursement to the Owner.

D. Coordination with Owner’s Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Owners testing agencies in the performance of their work and shall provide the following:

1. Information as to time and place of starting shop fabrication and a field construction and erection schedule, one week prior to the beginning of the work.

2. Site File: At least one copy of each approved shop drawing shall be kept available in the contractor’s field office and the drawings not bearing evidence of approval and release for construction by the Design Professionals shall not be kept on the job. Provide drawings for the work to be performed in the shop or field one week prior to the start of work.

3. Representative sample pieces requested by the inspection agency for testing, if necessary.

4. Full and ample means of assistance for testing and inspection of material.

5. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field.

E. Duties of the Owner’s Testing Agencies:

1. Reports: The Testing Agency shall prepare reports of the structural steel work including progress and description/area of work, tests made and results. Reports of inspection of welding shall include deficiencies noted and corrections made, and other items pertinent to acceptance or rejection of the work. The reports shall state whether specimens comply with or deviate from contract requirements. The daily reports shall be collected and delivered to the Design Professionals, Contractor, DSA and Owner weekly.
2. Rejection: The Owner’s Testing Agency has the right to reject any material, at any time, when it is determined that the material or workmanship does not conform to the Contract Documents. The Testing Agency shall report deficiencies to Owner, Design Professionals, and Contractor immediately.

3. Structural steel work and general testing requirements: The Testing Agency shall perform the following shop and field inspections in addition to any other inspections enumerated above or specified on the Contract Documents:

   a. Shop inspection of steel shall include alignment and straightness of members, preparation for connections, dimensional checks, testing of shop bolts, witnessing of welding procedures, testing of cuts, examination and testing of completed welds, headed studs and deformed bar anchors, finishing of column ends, cleaning, painting and storage of material. All shop fabrication shall be inspected in the shop.

   b. Field inspection of steel shall include connections, proper tensioning of bolts, levelness, plumbness and alignment of the frame, conformance to AWS welding methods, examination of surface before welding, examination and testing of completed welds, headed studs and deformed bar anchors and field painting, including touch-up.

   c. Check qualifications of the following:
      
      i. Shop welding procedures and personnel
      
      ii. Shop stud welding setup and operators
      
      iii. Shop bolting procedure and crew

   d. Where testing is required for less than 100% of locations, select test locations at random and throughout the project.

   e. Review mill certifications for compliance with the Contract Documents. Where certification is questionable, test material.

   f. Visually inspect seam welds of tube and pipe for evidence of cracking or lack of fusion. At each end piece of tube or pipe, inspect interior face of seam weld for evidence of cracking, lack of fusion, or less than full flashing.

4. High Strength Bolting: The Testing Agency inspector shall inspect high strength bolted construction in accordance with RCSC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts," including but not limited to:

   a. Surface preparation and bolt type conforms to plans and Specifications prior to start of bolting operations.
b. Proper bolt storage and handling procedures per codes and standards referenced by this Specification are being followed.

c. Visually inspect all bolted connections.

d. For all bolted connections that are indicated as snug tight, connections are properly compacted and brought to the snug tight condition progressing outward from the most rigid part.

e. For all bolted connections that are indicated as pretensioned or slip critical, pre-installation verification testing is performed by the inspector in cooperation with the contractor in accordance with RCSC section 9.2 and section 7.

f. For all bolted connections that are indicated as pretensioned or slip critical, through routine observation, as defined in RCSC 9.2.1, 9.2.3 or 9.2.4, that the pretensioning methods of RCSC 8.2.1, 8.2.3, or 8.2.4, as appropriate, are performed.

i. "Routine observation" is defined as observation of 10 bolts for every 100 bolts with a minimum of 2 bolts per connection.

g. Retest bolted connections that fail initial inspection after correction by the Fabricator or Erector.

5. Welding:

a. Review of submittals: Welding procedures including prequalification, qualifications test and, for heavy shapes and high restraint welds, the welding procedure prepared by the Contractor's Engineer or Welding Consultant.

b. Complete joint penetration welds: Test all complete joint penetration welds for soundness by means of either radiographic or ultrasonic testing in accordance with AWS D1.1 and ASTM E164 procedures. For all complete joint penetration welds at top flange of cantilever beams and splices in beam flanges, test for soundness by means of ultrasonic testing and magnetic particle testing. All flaws in plate or flange material revealed during such tests shall be repaired by the Contractor at the Contractor's expense.

c. Partial penetration welds: Test all partial penetration welds for soundness by means of visual and magnetic particle inspection, unless other methods are specified in the Contract Documents. All flaws in plate or flange material revealed during such tests shall be repaired by the Contractor at the Contractor's expense.
d. Fillet welds: Visually inspect all fillet welds. For all fillet welds at top flange of cantilever beams and splices in beam flanges, test for soundness by means of magnetic particle testing. In addition test ten percent (10%) of all fillet welds at other location using a non-destructive method, such as dye penetrant or magnetic particle. Select test locations randomly throughout the structure, but test at least one weld in each location with 6 or more welds per connection. If, in the opinion of the SER and Testing Agency this testing discloses a large ratio (10% or more) of unacceptable welds, the required percentage of tested welds may be increased by the SER to 100%, all at the Contractor's expense.

e. Inspection and Testing by the Testing Agency of high restraint welds and where Heavy Shapes are to be joined by partial or full penetration welds in tension:

i. Joint Preparation: Monitor fit up and joint preparation (bevel angle, etc.) for conformance to the submitted welding procedures including preheat and interpass temperature. Monitor base metal temperature during welding operations.

ii. Test Full Penetration Welds in accordance to the requirements of this Specification section, ultrasonically in accordance with AWS D1.1 procedures. On T or corner joints, pay careful attention to the heat affected zone and base metal where the weld shrinkage stresses are in the through thickness direction.

iii. Test Partial Penetration Butt Joints in accordance with this Specification section by the magnetic particle method. At T or corner joints, in addition to the magnetic particle testing, ultrasonically scan the heat affected zone and adjacent base metal from face "C" per AWS D1.1 Table 6.7 and Annex K-7 to detect lamellar tears and shall be done with a compression wave. The Testing Agency shall submit a testing procedure that includes evaluation (acceptance criterion) procedures to the Design Professionals for review.

f. Comply with the requirements of DSA IR 17-3.

6. Headed Studs, Threaded Studs and Deformed Bar Anchors: Visually inspect all headed studs and deformed bar anchors for complete fusion and full 360-degree weld flash (or fillet).

a. At the beginning of the work shift or any change of operator, equipment, position or setting, perform pre-production testing per AWS D1.1, on the two studs or anchors. Verify that two consecutive studs or anchors have satisfied pre-production testing prior to starting production welding of studs or anchors.
b. For production studs and anchors, visually inspect all head studs and deformed bar anchors for complete fusion and full 360 degree weld flash (or fillet) per AWS D1.1. Check all studs and anchors with incomplete fusion or which have been repaired by welding, by bending to an angle of 15 degrees from its original axis (away from any missing flash). Torque test all threaded studs with incomplete fusion. If more than twenty percent of studs fail on one member, check all studs or anchors on member.

c. In addition to studs and anchors that fail visual inspection, test at random five studs or anchors at each of six members per floor. Test additional member for each member with any defective studs or anchors.

d. Contractor to replace any studs that crack or break. Contractor to only straighten studs that would foul other work or have less than 1 inch (25mm) cover in bent position.

7. Cleaning & Painting:

a. Prior to shop painting, examine all fabricated pieces to verify proper cleaning in accordance with this Specification.

b. Examine all shop painting to verify conformance with this Specification.

c. Examine loading and unloading of steel to visually observe that damage does not occur during shipping and handling.

8. Remedial Work: The Testing Agency shall indicate to the Contractor where remedial work must be performed and will maintain a current list of work not in compliance with the Contract Documents. This list shall be submitted to the Design Professionals and Owner on a weekly basis.

9. Certification: When all work has been approved by the Testing Agency, the Testing Agency shall certify in a letter to the Design Professionals and Owner that the installation is in accordance with the design and Specification requirements (including applicable codes).

1.10 QUALITY CONTROL BY CONTRACTOR

A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained.

B. Structural Steel shall be identified in accordance with the requirements contained in AISC 360.
C. The Contractor shall immediately report to the Design Professionals any deficiencies in the work which are departures from the Contract Documents which may occur during construction. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Design Professionals. After proposed corrective action is accepted by the Design Professionals and Owner, the Contractor shall correct the deficiency at no cost to the Owner.

D. The Owner's general review during construction and activities of the Owner’s Testing Agency are undertaken to inform the Owner of performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.

1.11 OBSERVATIONS AND CORRECTIONS BY DESIGN PROFESSIONALS

A. Review: The Design Professionals will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.

B. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated by failure of the Contractor to perform the work in accordance with the Contract Documents, the Contractor is responsible for paying for additional work performed by the Design Professionals at their standard firm-wide billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.

1.12 PERMITS AND WARRANTY

A. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City, State, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Owner and Design Professionals.

B. Structural Steel shall be identified in accordance with requirements contained in AISC 360.

C. Warranty: Upon completion of all work to be performed under this Contract, the Contractor shall execute and deliver in a satisfactory form a warranty that all workmanship and materials used in the performance of this Contract shall remain free from defects for a period of one (1) year from the date of execution of the Warranty.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural steel shall conform to the requirements listed on the Structural General Notes.
2.2 SHOP COATINGS

A. Standard Primer: SSPC – Paint 25 or Paint 25 BCS, Type I or Type II zinc oxide raw linseed oil and alkyd primer. Color to be determined by Architect. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.

B. Zinc Rich Primer: SSPC-Paint 20, Type I or Type II, Zinc rich primer utilizing either an organic or inorganic binder with a minimum zinc content of 80 percent by weight in the dry film. The primer shall provide a surface meeting AISI Slip Critical Class B (slip coefficient =0.50 min) requirements. Color to be determined by Architect. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.

C. Hot Dip Galvanizing: ASTM A123, weight of coating shall average not less than [2.3] oz per square foot ([0.70] kg/ m²), with no individual thickness less than [2.0] oz per square foot ([0.61] kg/m²).

D. Galvanizing Repair Paint: ZRC Cold Galvanizing Compound, or other complying with SSPC-Paint 20.

2.3 ACCESSORIES

A. High Strength Bolts: Conform to the provisions of the Research Council on Structural Connections (RCSCC) "Specifications for Structural Joints using ASTM A325 or A490 Bolts" except that nuts shall be ASTM A563 Grades DH or DH3 (hardened) for both A325 and A490 bolts. Twist off type bolts (Tension Control bolts) shall additionally conform to ASTM F1852 or ASTM F2280.

B. All bolts shall be new, and not re-used.

C. Where A325 galvanized bolts nuts and washers are required, they shall be in accordance with ASTM F2329 and ASTM A153, Class C. Where A588 steel is used, bolts, nuts and washers shall be Type 3.

D. Direct Tension Indicators: Meet requirements of ASTM F959.

E. Anchor Rods: Per structural General Notes.

F. Washers:

1. Round washers shall conform to American Standard B 27.2 type b

2. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard F436.

3. Beveled washers shall be square, smooth and sloped so that contact surfaces of the bolt head and nut are parallel.
4. The diameter of the hole of square beveled washers shall be 1/16 inch (1.5mm) greater than the bolt size for bolts smaller than one inch (25mm), and shall be 1/8 inch (3.0mm) greater than the bolt size for bolts larger than one inch (25mm).

5. Comply with requirements of RCSC for all washers including thickness, size and hardness, depending on connection details.

G. Welding Electrodes: Electrodes shall be low hydrogen and shall be selected from Table 4.1.1 of AWS D1.1. Comply with CVN requirements of the Structural General Notes.

1. Shielded Metal-Arc Welding: Welding electrodes for manual shielded metal-arc welding shall conform to the specification for Mild Steel Covered Arc-Welding Electrodes, AWS A5.1 E70 or 80, or the specification for Low-Alloy Steel Covered Arc-Welding Electrode, AWS A5.5.

2. Submerged-Arc Welding: Bare electrodes and granular flux used in submerged-arc welding shall conform to F70 or F80 AWS flux classifications of the specification for Gare Mild Steel Electrodes and Fluxes for submerged-arc Welding, AWS A5.17.

3. Where Charpy V-Notch values are required on the base metal, an electrode meeting the Charpy V-Notch requirements listed in the Structural General Notes shall be provided.

H. Headed Studs (shear connectors) shall be per Structural General Notes.

I. Deformed Bar Anchors shall be as specified in Structural General Notes.

J. Grout: Refer to General Notes.

K. Post-installed Anchors shall be per Structural General Notes.

PART 3 - EXECUTION

3.1 PREPARATION

A. Work by Others: Examine all work prepared by others to receive work of this Section and report any defects affecting installation to Design Professionals. Commencement of work will be construed as complete acceptance of preparatory work by others. The Contractor alone shall be responsible for checking the dimensions and coordination of the structural steel work with other trades.

B. Anchor Rods: Anchor rods shall be set in conformance with Section 7.5 of AISC 303. At least 20 working days prior to the start of the structural steel erection, the Contractor shall ascertain by accurate survey the existing location, alignment, and elevation of the anchor rods embedded in the concrete by others. The Contractor shall immediately bring to the attention of the Design Professionals any discrepancies observed between
the Contract Documents and the as-built conditions. Steel erection shall not start until corrective measures, if required, have been performed.

3.2 FABRICATION

A. Fabricate and assemble structural steel in the shop to the greatest extent possible.

B. Tolerances:

1. Conform to the tolerances of the AISC "Code of Standard Practice," compensate for the difference between the temperature at time of fabrication and the mean temperature in service.

2. Elevator shafts used for temporary hoists shall conform to the detailed requirements of the hoist manufacturer.

3. Conform to the tolerances of the AISC "Code of Standard Practice", Section 10 (AESS) for architecturally exposed structural steel as indicated as "AESS" on the Drawings.

C. Holes: Holes shall be provided in members to permit connections to the work of other trades or contracts, and for passage through the member of work of other trades. All holes shall be accurately drilled or punched at right angles to the surface of the metal in accordance with AISC Specifications. Holes shall not be made or enlarged by burning. Burning or drifting unfair holes will not be permitted. Holes that must be enlarged shall be reamed, but only up to the next larger bolt size. Where unfairness exceeds the maximum, weld hole in base material solid and drill hole of proper size. Drift pins will be allowed only to bring together the several parts for connection. Holes in base plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool.

D. Camber: Provide camber as indicated on the Contract Documents. Where no camber is indicated, provide natural camber up.

E. Cutting: Manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. If manual shop cutting is required, it shall be done only with a mechanically guided torch, except that an unguided torch may be used where the cut is more than 1/2 inch (12mm) from the finished dimension and final removal is completed by means such as chipping or grinding to produce a gouge-free surface of quality equal to that of the base metal. At restrained joints and as indicated elsewhere, weld access holes shall be ground smooth.

F. Anchor Rods: Rigid steel templates and anchor rods shall be furnished, labeled and shipped in sets indicating sizes and locations of columns, together with instructions for setting of anchor rods. Plate washers per Typical Details shall be provided.
G. Bolting: Bolts shall be driven accurately into the holes without damaging the threads. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, beveled washers shall be provided to give full bearing under the head or nut.

H. Bolts indicated as “finger tight” on the Contract Documents shall be prevented from backing off by using lock nuts, thread compound or deformed threads.

I. Installation of High Strength Bolts:

1. Except where "snug tight" installation is specifically permitted on design Drawings, all high strength bolts shall be installed with full pretension using Turn-of-Nut Pretensioning, Twist-Off Type Tension Control Bolt Pretensioning or Direct-Tension-Indicator (DTI) Pretensioning in accordance with the "Specification for Structural Joints Using ASTM A325 or A490 Bolts". Calibrated Wrench Pretensioning shall only be used where specifically approved by the SER.

2. Comply with special washer requirements of the RCSC, such as those related to slotted and oversize holes, and tapered flanges. DTI "washers" shall not be substituted for such required washers.

3. All high strength bolt assemblies (including Tension Control bolts and DTI’s) used in pretensioned connections shall be verified in accordance with the Pre-Installation Verification section of the RCSC.

4. Clean and re-lubricate bolts and nuts that become dry or rusty before use, except Tension Control bolts must be re-lubricated by manufacturer.

J. Welding of Structural Steel:

1. Pre-Weld Inspection: The surface to be welded and the filler material to be used shall be subject to inspection before welding is performed.

2. Welds indicated on the Contract Documents or the approved shop or erection drawings shall be created by electric arc welding processes that comply in all respects with the codes and specifications herein noted covering the design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors. Control the heat input, weld length, weld sequence and cooling process to prevent distortion of the completed assembly.

3. Each welder’s work shall be traceable.

4. Special Requirements: For high restraint welds and welds at heavy shapes, follow approved welding procedures for weld process, sequence, pre-heating and cooling. Use stress relieving techniques where shown in the approved procedure developed by the Contractor's Welding Consultant.
a. Special Procedures: Prior to the start of production welding, the contractor shall demonstrate to the Testing Agency that preheat can be maintained without relying on heat from the arc. For field welding, the contractor shall provide a shelter to protect each joint from inclement weather (rain, snow, etc.), from start until completion of the joint.

b. Preheat and Postheat: Preheat shall be sufficient to prevent cracking, but in no case less than required by AWS D1.1. For high-restraint welds, minimum preheat shall be 225 degrees F (105oC). The preheat shall be maintained throughout the thickness of the material for a distance equal to twice the material thickness on both sides of the joint at a minimum. Where different thicknesses of steel are being joined, the greater thickness shall govern. Preheat shall be measured on the face opposite the side of the heat application. Preheat shall be applied uniformly in a manner that does not harm the surface of the material nor cause surface temperatures to exceed 1100 degrees F (600oC). Should stress relief heat treatment be required, the contractor shall submit a written procedure.

c. Prior to heat treatment on a production weld, prepare and treat a test sample per the contractor’s written procedure for tensile and Charpy V-notch tests in accordance with ASTM requirements.

5. Supplemental Welding Requirements:

a. Nonfusible Backing: The use of nonfusible backing materials, including ceramic and copper, is permitted only with satisfactory welder qualification testing performed using the type of backing proposed for use and using the test plate shown in AWS D1.1, Figure 4.21, except that groove dimensions shall be as provided in WPS and PQR. For nonfusible weld tabs and short segments of nonfusible weld backing used at the ends of welds between shear plates and column faces, or at the ends of continuity plate welds, special welding personnel and welding procedure qualification testing is not required.

6. Welded Joint Details:

a. Welding Backing: The use of weld backing shall be in accordance with AES D1.1. Weld backing shall be removed where required by the Contract Documents or for the WPS by AWS D1.1

   i. If groove weld backing is permitted to remain, the backing shall not exceed 3/8” thickness.

   ii. Heavy Section Splices Requiring Removal of Weld Backing: All welded splices of Heavy Sections, shall have the weld backing removed. Where fusible backing material is used, the root pass area shall be backgouged after backing bar removal,
backwelded until flush or with slight reinforcement. The surface shall then be ground Extra Smooth.

b. Weld Tabs:

i. Use of Weld Tabs: 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.

1) Weld tabs shall extend beyond the edge of the jointing a distance equal to a minimum of the part thickness, but not less than 1”.

2) Weld tabs shall be oriented parallel to the joint preparation and to the weld direction.

3) Nonfusible weld tabs may be used in applications and locations where qualified in accordance with AWS D1.1, Section 4.

ii. Heavy Section Joint Weld Tab Removal and Finish: All welded tension splices in Heavy Sections, shall have the weld tabs removed and ground smooth.

c. Weld toes: Weld toes, whether groove welds or fillet welds, shall provide a smooth transition between the weld and base metal. The as-welded profile is adequate provided it satisfies the criteria of AWS D1.1, Section 5.24.

d. Weld access holes:

i. Weld access holes shall meet the dimensional, surface finish, and testing requirements of AISC 360 Chapter J1.6 and AWS D1.1, except as otherwise required by the Contract Documents.

ii. Where the height of the weld access hole exceeds the quantity k-tf+1½” or where the length of the weld access hole exceeds 4 tf (where k and tf are defined in AISC 360), welded reinforcement is required. Notify the Design Professionals for specific instruction.

e. Welding for Moment Connections shall be sequenced so as to minimize residual stresses in the joint.

7. Deficient Welds: Welds found deficient in dimensions but not in quality may be enlarged by additional welding. Any weld found deficient in quality shall be removed and repaired in accordance with AWS D1.1, Section 5.26.
K. Surface Finish

1. Flush Surfaces: Welds in butt joints required to be flush shall be finished so as to not reduce the thickness of the thinner base metal or weld metal by more than 1/16”, or 5% of the material thickness, whichever is less. Remaining reinforcement shall not exceed 1/32” in height. However, all reinforcement shall be removed where the weld forms part of a faying or contact surface. All reinforcement shall blend smoothly into the plate surfaces with the transition areas free from undercut.

2. Finish Methods and Values: Chipping and gouging may be used, provided these methods are followed by grinding. Where surface finishing is required, surface shall be Extra Smooth, unless otherwise noted or specified in this document. Measurement of surface finish values by visual appearance or tactile comparison is acceptable.

L. Repair of Gouges: Gouges are not permitted in areas requiring and Extra Smooth finish surface, or where specifically prohibited by AWS D1.1 or this Specification. Repair of gouges shall meet the following requirements, unless otherwise noted:

1. Shallow Gouges: Gouges up to 3/16” deep shall be removed by grinding as per D1.1, or to a radius of not less than 3/8”.

2. Deep Gouges: Gouges deeper than 3/16” shall be repaired by welding. Prior to welding, gouges shall be ground to provide an Extra Smooth contour with a radius not less than 3/8”. The repair area shall be preheated to a temperature between 400°F and 550°F, measured at the point of welding approximately one minute after removal of the heating source, or shall be preheated in accordance with AWS D1.1 Annex I for high restraint. A written repair WPS for the application shall be followed. Following completion of welding, the area shall be ground Extra Smooth, with fairing of the welded surface to adjoining surfaces where applicable, and shall be inspected using magnetic particle testing (MT).

3. The transitional slope after gouge removal shall not exceed 1:5.

M. Bearing:

1. Bearing ends of columns shall be milled or sawn square perpendicular to axis of the column.

2. Finish bearing areas of base plates per AISC M2.8.

N. Stiffeners: Fitted stiffeners shall be ground to fit closely against flanges.

O. Cleaning and Preparation of Steel Surfaces:

1. Clean all steel work in accordance with the Steel Structures Painting Council (SSPC). Method specified herein that corresponds to its location and exposure. Steel work to be painted shall be painted within the same day that it is cleaned.
a. Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): SSPC-SP-2, Hand Tool Cleaning.

b. Interior, Exposed in the Finished Building: SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the Drawings.

c. Exterior (exposed to weather or in unconditioned space): SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the Drawings.

d. Architecturally Exposed Structural Steel where indicated on the Contract Documents as “AESS”: SSPC-SP-10, Near White Blast.

e. Members to be Hot Dipped Galvanized: SSPC-SP3, Power Tool Cleaning, before galvanizing.

P. Shop Coating:

1. Where painting is specified, paint all steel work in accordance with the Steel Structures Painting Council (SSPC) Method specified herein that corresponds to its location and exposure and in accordance with manufacturer’s written instructions. Paint steel work the same day that it is cleaned.

   a. Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): No Paint.

   b. Interior, Exposed in the Finished Building: SSPC – Paint 25

   c. Exterior (exposed to weather or in unconditioned space): SSPC – Paint 20

   d. Architecturally Exposed Structural Steel (AESS) to receive a 2 or 3 coat paint system, unless specified otherwise by the architect.

2. Protect finished bearing surfaces with a rust-inhibiting coating which is to be removed immediately prior to erection.

3. Do not paint:

   a. Surfaces within six (6) inches (150mm) of field welds

   b. Surfaces to be encased in concrete or to receive cementitious fireproofing

   c. Contact surfaces of high-strength bolted Slip Critical connections (unless surface prep and paint has been specifically prequalified by the contractor or approved for use in this location by the SER)
d. Surfaces required for testing and preheat, until all testing and preheat has been performed

e. Finished bearing surfaces (use removable rust-inhibiting coating)

4. Paint shall be applied thoroughly and evenly to dry surfaces only when surface temperatures are above dew-point, in strict accordance with manufacturer's instructions.

5. Surfaces of exterior members which are inaccessible after assembly or erection shall receive their second coat of the approved paint, in a different shade, in the shop.

6. Hot-dip galvanize the following steel members:

a. All angles, steel plates and shims supporting exterior masonry or exposed to the weather, including shelf, arch and relieving angles

b. All connections between the above angles and steel plates and the supporting structural member, including clip angles and hardware

c. Any other steel members indicated as "Galvanized" on the Contract Documents.

d. All miscellaneous metal, angles, clips, etc. on exterior masonry walls.

3.3 ERECTION

A. Tolerances: Erect all work plumb, square and true to lines and levels in strict accordance with the structural requirements of the building within tolerances of the AISC Code of Standard Practice, unless otherwise indicated on the Contract Documents. Compensate for the difference between the temperature at time of erection and the mean temperature in service.

B. Bracing: Brace the frame during erection in accordance with the Contractor's erection procedure.

C. Errors: Immediately report to the Design Professionals any errors in shop fabrication, deformations resulting from handling and transportation, and improper erection that affects the assembly and fitting of parts. Prepare details for corrective work and obtain approval of the method of correction. Approved corrections shall be made expeditiously at the sole expense of the Contractor.

D. Column Base Plates: Support and align on steel shims or setting bolts. After the supported members have been plumbed and properly positioned, tighten anchor rod nuts in preparation for grouting. Cut off wedges and shims flush with edges of plates and leave in place. The use of leveling plates will not be permitted.
E. Grouting: Refer to General Notes. Grout base plates immediately after the first tier of columns are plumbed. Do not proceed with steel erection above the first tier until base plates are grouted.

F. Bolting and Welding of Structural Steel: See Section on "Fabrication".

G. Bearing Surface: Clean bearing surfaces and surfaces that will be in permanent contact before the members are assembled.

H. Splices: Splices will be permitted only where indicated on the Contract Drawings or the reviewed shop drawings. Fasten splices of compression members only after surfaces are cleaned and abutting surfaces have been brought completely into contact. Fill any remaining gaps with steel shims driven into place and cut flush. Tack weld shims to each other and to members. Use runoff tabs at bevel weld splices. Cut off runoff tabs and ground smooth after weld completion.

I. Driftpins: Driftpins may be used only to bring together the several parts, and shall not be used in such a manner as to distort or damage the metal. Correct poor matching of holes by drilling to the next larger size and using a larger size bolt. Plug welding and redrilling will not be permitted, unless a specific instance arises and is approved by the SER.

J. Erection bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces. On non-exposed welded construction, remove erection bolts.

K. Hammering: Hammering which may damage or distort the members will not be permitted.

L. Do not use cutting torches in the field without the specific approval of the SER for each application. Where cutting torch use is permitted, all the requirements of the Section on "Fabrication" shall apply.

M. Additional Material and Labor: If the Contractor furnishes additional material and labor for the purpose of erection or if the erection method requires that material be added to certain members, the required modifications shall be at the sole expense of the Contractor.

N. Alignment: Following erection, accurately align, level, and adjust all members prior to final fastening. Conform to AISC standard tolerances unless otherwise noted in the Contract Documents.

O. Touch-Up and Field Applied Paint: After erection, clean all damaged areas in the shop coat, exposed surfaces of bolts, bolt heads, nuts and washers and all field welds and unpainted areas adjacent to field welds according to manufacturers recommendations and paint with the same paint used for the shop coat. Match the touch up and field applied paint color to the as-built paint color. After touch up, at exterior (exposed to the weather or in unconditioned space) steel members apply a full coat of the specified paint in a different shade than the shop applied coat.
P. After erection, clean all damaged galvanized areas, welds and areas adjacent to welds and paint with the specified galvanizing repair paint.

Q. Clean all steel members of mud and debris and construction residue prior to erection.

R. Headed Studs and Deformed Bar Anchors:

1. End weld headed studs and deformed bar anchors with an automatic process in accordance with section 7 of AWS D1.1.

2. Areas to which studs are to be attached must be free of foreign material, such as rust, oil, grease, paint etc. When mill scale is sufficiently thick to cause difficulty in obtaining proper welds, remove by grinding or sand blasting.

3. Remove ceramic ferrules from studs and work after welding.

END OF SECTION
SECTION 05 12 10
STRUCTURAL STEEL – ADDITIONAL SEISMIC REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

The work covered by this Section shall include all labor, material, equipment, permits, engineering and other services necessary for the fabrication and installation of structural steel, noted as part of Seismic Force Resisting System (SFRS) on the Contract Drawings.

A. Provisions included herein apply to all members and connections denoted as “SFRS” in the contract documents.

B. Provisions included herein are supplementary to the requirements of Section 05 12 00.

C. Where provisions included herein conflict with the requirements of Section 05 12 00, the provisions of this section shall govern.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

Structural Steel Sections

1.4 CODES AND STANDARDS

A. Building Code: Structural steel work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the Drawings.

B. Standards:


3. “Seismic Welding Supplement” (AWS D1.8), 2009
C. Definitions:

1. Extra Smooth: Surfaces noted herein as “Extra Smooth” require a finish with surface variation of 500 micro-inches or less (AWS C4.1, Sample #4).

2. Seismic Force Resisting System (SFRS): The Seismic Force Resisting System (SFRS) is defined as all items designated “SFRS” on the Structural Drawings, including columns, beams, and braces, and their connections along grid lines denoted “SFRS” on the framing plans.

1.5 CONTRACTOR QUALIFICATIONS

A. Welder Qualifications: Welders, welding operators, and tackers shall be qualified in accordance with AWS D1.8.

1.6 SUBMITTALS

A. Shop and Erection Drawings: Detailed shop and erection drawings for structural steel and connections that are part of the SFRS shall show:

1. Identification of members and connections of the Seismic-Force-Resisting System.

2. Identification of welds in the Seismic-Force-Resisting System.

3. Other items as required by AISC 341, Section 5.

4. Shop drawings shall include connection details drawn to scale for members of the Seismic-Force-Resisting System.

B. Welding Procedure Specifications (WPSs): Welding Procedure Specifications (WPSs) shall conform to the requirements of AWS D1.8.

1. If the maximum interpass temperature is to exceed 550 degrees Fahrenheit, provide qualification testing per AWS D1.8, Section 6.5.2.

C. Welding Performance Qualification Records (WPQRs): Submit documentation that the welder has passed all designated supplemental welder qualification testing required for the types of welding to be performed. Submit documentation showing that the welder continued to use the applicable welding process on an ongoing basis since the WPQR test was conducted, in accordance with AWS D1.8, Section 5.2.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Electrode Storage and Exposure Limits for Demand-Critical Welds: The exposure time limit for electrodes shall be in conformance with AWS D1.8 Section 6.4.
1.8 QUALITY ASSURANCE BY OWNER’S TESTING AGENCY

A. Submittals: The Owner's Testing Agency will submit the following items:

1. Written Practice for Owner’s Testing Agencies shall include welding inspection procedures to meet the requirements of AWS D1.8.

B. Duties of the Owner’s testing Agencies:

1. Welding Inspection: The Welding Inspector shall perform inspection tasks necessary to meet the requirements of AWS D1.8, AISC 341 Appendix Q, and the requirements of the Contract Documents.

2. Non-destructive Testing of Welded Joints
   a) Visually inspect all welds.
   b) Non-destructive testing shall be conducted at locations required by AWS D1.8 and AISC 341 Appendix Q5.2. Frequency of testing shall be as required by AISC 341 Appendix Q5.2 and Table 1-1.
   c) Magnetic Particle Testing (MT) shall be performed in accordance with AWS D1.1, and AWS D1.8 Annex F.
   d) Ultrasonic testing (UT) shall be performed in accordance with AWS D1.1 and AWS D1.8.
   e) Weld Acceptance Criteria shall be in accordance with AWS D1.1 and AWS D1.8. Regions of welds that cannot be inspected shall be identified and recorded, and the Design Professionals shall be notified.

3. Inspect structural steel to verify that the Protected Zones of members of the Seismic-Force-Resisting System are free of damage and attachments not approved by the Design Professionals.
Table 1-1: Nondestructive Testing (NDT) Requirements

<table>
<thead>
<tr>
<th>Weld Category</th>
<th>Nondestructive Testing Requirements</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Complete-Joint-Penetration Welds(^1)</td>
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<tr>
<td>SFRS welds</td>
<td>MT 25% of joints, full length(^2) and UT 100% of joints, full length(^2)</td>
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</tbody>
</table>

Notes:

1. UT is required only when the weld thickness is \(\frac{5}{16}\)" or greater.
2. Reduction of the rate of UT and MT testing per AISC 341, Appendix Q5.2, items (g) and (h) is permissible.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Shapes, Plates, Tube, Pipe, and other sections
   1. Steel using complete joint penetration groove welds that fuse through the thickness of the flange or web that is part of the SFRS shall have a minimum Charpy V-notch impact testing value of 20 ft-lbs at 70 degrees Fahrenheit.

B. High Strength Bolts, Nuts, and Washers:
   1. Bolted joints in the Seismic-Force-Resisting System shall be Slip-Critical, with pretensioned high-strength bolts and a Class A faying surface or better.

C. Welding materials:
   1. Weld electrodes shall meet the requirements of AWS D1.8 Section 6.3.
      a) Lowest Anticipated Service Temperature (LAST), as defined in AWS D1.8, is 20 degrees Fahrenheit.

PART 3 - EXECUTION

3.1 ERECTION

A. Requirements for bolted and welded joints specified in Part 2 of this Specification shall also apply to field connections unless otherwise noted.
3.2 FABRICATION

A. General Requirements:
   1. Holes and attachments to structural steel in areas designated as the Protected Zone are not allowed except as explicitly shown or noted on structural drawings.

B. Bolted Joints:
   1. Seismic-Force Resisting System joints shall be slip-critical (friction-type) as defined in AISC 348 with Class A or better faying surfaces.

C. Welded Construction: (shop and field)
   1. Weld in accordance with AWS D1.8.
   2. Welded Joint Details:
      a) Weld Backing: The use of weld backing shall be in accordance with AWS D1.1. Weld backing shall be removed where required by the Contract Documents or for the WPS by AWS D1.1.
         i. Connections of the SFRS in which backing is not removed: backing shall be attached to the member or plate that does not have its surface prepared for the groove weld. Attachment shall be by either a 5/16" fillet or 3/16" groove weld along the complete bar length on the side of the bar opposite the groove weld.
         ii. Beam-Column Connection Joints Requiring Removal of Weld Backing: Conform with AWS D1.8, Sections 6.7 and 6.8. Perform MT on the fillet weld and the immediately adjacent area.
      b) Weave passes are not permitted in groove welds in the SFRS.
      c) Column continuity plate details:
         i. If weld backing are used and remain in place, they shall receive a reinforcing fillet weld between the backing bar and column flange. No fillet weld should be placed between backing bar and continuity plate.
         ii. Weld terminations near the end of the column flange tips may be completed using weld tabs. Weld tabs shall be removed. Conform to AWS D1.8 Sections 6.10.3 and 6.10.4. Following finishing, the edge shall be inspected using MT. Fillet weld
terminations between the continuity plate and column web shall be approximately \( \frac{3}{4}'' \) from each end of the joint.

d) Tack Welds in the SFRS Protected Zones: Tack welds in the SFRS protected zone are permitted only if they are incorporated into a required weld, in accordance with AWS D1.8, Section 6.16.

D. Repair of Discontinuities in Protected Zone of Seismic-Force-Resisting System.

1. Repair of Discontinuities: If erection aids within the Protected Zone cannot be avoided, the Design Professionals’ approval of the aid’s placement, use, and the repair method is required. Conform to AWS D1.8 Section 6.15.4.

2. Air Carbon Arc Cutting and Thermal Cutting: Air carbon arc cutting (CAC-A) and thermal cutting is permitted in the Protected Zone with the prior approval of the Design Professionals for the removal of weld backing and weld tabs, as specified in these documents.

3. Gouges in members and connections in the Seismic-Force-Resisting System shall be repaired according to the requirements of this Specification. Weld filler metal requirements for the Seismic-Force-Resisting System apply, unless otherwise noted.

E. Repair of Gouges: Gouges are not permitted in areas requiring an Extra Smooth finish surface, or where specifically prohibited by AWS D1.8 or this Specification. Repair of gouges shall meet the requirements of Section 05 12 00, Section titled “Repair of Gouges”.

END OF SECTION
SECTION 05 50 00
METAL FABRICATIONS

PART 1 -  GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of all items of miscellaneous metal and related accessories and fasteners as indicated in Contract Drawings including but not necessarily limited to the following:

1. Steel pipe railing, handrails, guardrails and brackets.
2. Continuous inserts for pipe and conduit supports.
3. Backing and mounting plates for equipment items.
4. Ceiling support system.
5. Anchor bolts at non-structural elements.

B. Related Sections:

1. Section 05 12 00 - Structural Steel Framing.

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest additions apply).

6. American Iron and Steel Institute’s “Specifications for Design of Light Gauge Cold-Formed Stainless Steel Structural Members.”
7. Steel Structures Painting Council’s “Painting Manual”:
   a. Solvent Cleaning (SSPCC-SP 1).
   b. Hand Tool Cleaning (SSPC-SP 2).
   c. Brush-Off Blast Cleaning (SSPC-SP 7).
   d. Hot Phosphate Surface treatment (SSPC-PT 4).

   a. Inspection manual for hot dip galvanized products.

1.3 QUALITY ASSURANCE
   A. Welded Qualifications: Welders shall be qualified in accordance with AWS D1.1.
   B. Design criteria:
      1. Work shall be designed to support normally imposed loads and conform to AISC requirements.
      2. Built-up parts shall not exhibit warp.

1.4 SUBMITTALS
   A. Manufacturer’s literature describing products including details and dimensions.
   B. Shop Drawings:
      1. Show a large scale construction of various parts, methods of joining, thickness of metals, profiles of surfaces, reinforcing, anchorage, and structural supports. Include information regarding concealed and exposed joints, welds, and fastenings.
      2. Where welded connectors and concrete inserts are required to receive work, show size and locations required.
   C. Samples: Only as requested by the Architect.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING
   A. Deliver, store, and handle packaged materials in original containers with seals unbroken and labels intact until time of use.
   B. Discharge materials carefully and store on clean concrete surface or raised platform in safe, dry area.
1.6 JOB CONDITIONS

A. Scheduling, Sequencing:
   1. Ensure timely fabrication of items to be embedded or enclosed by other work.
   2. Furnish information and assistance required for locating embedded items and be responsible for proper locations.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND ACCESSORIES

A. Ferrous Metals:
   1. Structural Steel Shapes: ASTM A36, conforming to AISC specifications.
   3. Steel Sheets: ASTM A570, Grade 36.
   5. Steel Bars: ASTM A36.
   6. Steel Tubing: ASTM A500, Grade B.
   7. Steel Plate: ASTM A36.
   9. Welding electrodes: E-70XX.

B. Fastenings:
   1. Typical Unfinished Bolts, Nuts, and Washers: Low carbon steel standard fasteners, externally and internally threaded, ASTM A307 Grade A; malleable washers.

   2. Expansion Bolts: As specified in structural drawings; or equal product submitted by the contractor as a substitution request and approved by the SER.

C. Primer: Zinc-chromate type. Same as manufactured by Fuller-O'Brien Corp.'s Ne. 121-00; The Glidden Co.'s No. 4570; Sinclair paint Co.'s 20; or approved equal.
2.2 SPECIALTY FABRICATED PRODUCTS

A. Preparation:

1. Coordinate with other work supporting or adjoining miscellaneous metal and verify requirements of cutting out, fitting, and attaching.

2. Verify sizes, designs, and locations of items; do so at site whenever construction progress permits.

B. General Requirements

1. Fabricate items from materials noted and make true to profiles shown. Obtain the Architect's approval of proposed variations.

2. Miter corners and angles of frames and moldings unless otherwise noted.

3. Perform cutting, shearing, drilling, punching, threading, tapping as required for items or their adjacent work.

4. Drill or punch holes; do not use cutting torch.

5. Ensure shearing and punching leaves true lines and surfaces.

6. Items to be Galvanized: Fabricate in accordance with recommended practices of ASTM A385 and A386 unless specifically noted otherwise.

7. Fabricate exterior items for assembly and installation on site without field-welding of joint.

8. Ensure metal thickness and assembly details provide ample strength and stiffness.

9. Size sleeves for approximately 1/4-inch clearance all around.

C. Fastening:

1. Provide fasteners and anchor assemblies required for complete fabrication, field assembly, and erection.

2. Conceal fastenings wherever practicable.

3. Size internally threaded diameters to accommodate galvanized threaded bolts where galvanizing is required.

4. Permanent connections in Ferrous Metal Items: Employ welding wherever practicable; avoid bolts and screws.
D. Welding:

1. Use electric shielded-arc process according to AWS D1.1.

2. Maintain shape and profile of item welded.

3. Prevent heat blisters, run-throughs, and surface distortions.


5. Exposed Welds: Remove burrs, flux, welding oxide, air spots and discoloration; grind smooth, polish, or otherwise finish to match material welded.

E. Bolted and Screwed Connections:

1. Use bolts for field connections only, and then only as noted. Countersink heads; finish smooth and flush.
   
   a. Provide washers under heads and nuts bearing on wood.
   
   b. Draw nuts tight and prevent loosening of permanent connections by nicking threads.
   
   c. Use beveled washers where bearing is on sloped surfaces.

2. Where necessary to use screws for permanent connections in ferrous metal, use flat head type, countersink, fill screw slots, and finish smooth and flush.

3. Evenly space exposed heads.

F. Ferrous metal Pipe Railings:

1. Fabricate in largest sections practicable.

2. Weld shop joints; fit field joints with concealed pins and sleeves.

3. Flush fittings may be used for crosses and tees.

4. Return rails to wall as noted.

5. Close ends with welded cap and ease edges.

G. Handrail Bracket for Pipe Railings: Fabricate according to details.
2.3 FINISHES

A. Preparations of Surfaces:
   
1. Thoroughly clean mill scale, rust, dirt, grease, and other foreign matter from ferrous metal prior to galvanizing, hot phosphate treatment or painting.

2. Where hand cleaning methods are not adequate, clean in accordance with SSPC-SP 1, SSPC-SP 2, or SSPC-SP 7 as required.

3. Completely eliminate burrs, rough spots and pitting from normally exposed ferrous metal items.

B. Galvanizing:

1. Galvanize items after fabrication in largest sections practicable unless otherwise permitted or recommended by ASTM A384 and A385.

2. Where galvanizing is removed by welding or other assembly procedures, touch up abraded areas with molten zinc or zinc-rich paint.

3. Where ferrous metal item is noted to be galvanized, perform galvanizing in accordance with following standards as applicable to item:


b. Items Both under 1/8-inch Thickness and Fabricated from Rolled, Pressed, and Forged Shapes, Plates, Bars, and Strips: ASTM A383.

c. Other Fabricated items: ASTM A123.

C. Finish Schedule: Unless noted otherwise in Materials or Standard Catalog Products Articles.

1. Ferrous Metal, Interior Items:

   a. Concealed: Clean, chemically etch, and shop-apply one prime-coat.

   b. Exposed: Clean, treat with hot phosphate, chemically etch, and shop-apply one prime-coat.

2. Ferrous metal, Exterior Items:

   a. Concealed: Clean and hot-dip galvanize in accordance with galvanizing standards.

   b. Exposed: Clean, then hot-dip galvanize in accordance with galvanizing standards, chemically etch, and shop-apply one prime-coat.
3. Special Ferrous metal Items as Noted Below: Clean and hot-dip galvanize in accordance with galvanizing standards. Do not prime coat.
   a. Miscellaneous metal items in Penthouses such as stairs and railings.

4. Items Noted as Chrome-Plated: Same as US26D finish.

5. Hardware Including Fasteners (Bolts, Nuts, Washers, Etc.):
   a. Finish to match items fastened.
   b. Where galvanizing is required, hot-dip galvanize according to ASTM A153.

2.4 SOURCE QUALITY CONTROL

A. Test and Inspections: The owner will employ testing laboratory to test welds per CBC, Section 2212A.5.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas to receive work and verify that: Setting conditions and dimensions are correct to receive items.

B. Do not start installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install work plumb, true, rigid, and neatly trimmed out.

B. Do not tighten fastener through finish alone without spacer washers.

C. Provide concrete inserts or predrilled expansion bolts in fastening items into concrete.

D. Protect dissimilar metals from contact with each other or with other materials causing corrosion.

E. Fasten work tightly to prevent rattle or vibration except where expansion-contraction tolerances are required.

F. Use nonshrink grout mixed in accordance with manufacturer’s direction for setting frames, plates, sills, bolts and similar items.

G. Set items shown or required to be installed in sleeves with quicksetting anchor cement unless otherwise noted.

H. Protect metal from damage to surface, profile and shape.
3.3 CLEANING

A. Remove protective devices only when items will safe from other construction operations or removal is required to permit related work.

B. Clean prime-coated items as required for finish painting.

END OF SECTION
SECTION 05 73 00
METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Decorative metal railings associated with metal stairs, and metal railings located elsewhere.

B. Related Sections:
   1. Division 05 50 00 Section "Metal Fabrications" for non-decorative metal fabrications.
   2. Division 09 91 00 Section "Painting" for field-applied top coats for decorative metal railings.

1.2 DEFINITIONS

A. Railings: Guardrails, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Manufacturer's product lines of railings assembled from standard components.
   2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.
   1. Fittings and brackets.
   2. Welded connections.
   3. Assembled Samples of railing systems, made from full-size components,
including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

D. Welding certificates.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's 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 structural analysis, 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. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for 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.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.
PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.2 STEEL AND IRON

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:
   1. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed;
      Type 316 stainless-steel fasteners where exposed.
   2. Dissimilar Metals: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
   1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors.


2.4 MISCELLANEOUS MATERIALS
A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Zinc-Rich Primer: Comply with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat as specified in Division 09 Section "Painting."
   1. Products:
      a. Ameron; 68HS VOC.
      b. Tnemec; 90-97 Tneme-Zinc.
      c. Accepted equal.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.


E. 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.
   1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

B. Comply with California and ADAAG access requirements and with NAAMM "Pipe Railing Manual."
   1. Handrails for stairs shall be 1-1/4 inches to 1-1/2 inches diameter and mounted 1-1/2 inches clear from side walls. All welded joints and surfaces shall be ground smooth, with no sharp or abrasive corners, edges, or surfaces. Wall surfaces adjacent to handrails shall be smooth.
   2. Configuration: As indicated.

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. 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.

E. Form work true to line and level with accurate angles and surfaces.

F. Fabricate connections that will be exposed to weather in a manner to exclude water.
Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

G. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

H. Connections: Fabricate railings with welded or nonwelded connections as indicated.

I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   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 welds to comply with NOMMA’s “Voluntary Joint Finish Standards” for Type 1 welds: no evidence of a welded joint.

J. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer’s standard splicing method.

K. Form changes in direction by bending to smallest radius that will not result in distortion of railing member.

L. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of hollow railing members with prefabricated end fittings.

N. 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.

O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

Q. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

R. 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.
2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. 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.

2.7 STEEL AND IRON FINISHES

A. Non-Galvanized Railings:
   1. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
   2. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   3. High-Performance Coating System:
      b. Stripe paint corners, crevices, bolts, welds, and sharp edges.
      c. Second Coat and Top Coat: Specified in Division 09 Section "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster 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.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of 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 variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. 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.

C. 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.

3.4 ANCHORING POSTS

A. Where posts are indicated to be anchored to concrete, 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 nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer’s written instructions.

B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

C. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as indicated.

3.5 ATTACHING RAILINGS

A. Attach handrails to walls with wall brackets. Provide brackets 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.

B. Secure wall brackets to building construction as follows:
1. For concrete and solid masonry anchorage, use drilled-in expansion shields and...
hanger or lag bolts.
2. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.

3.6 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.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings 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 05 73 00
SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of all lumber framing, rough hardware and blocking as indicated in the contract drawings.

B. Related Sections:
   1. Section 03 10 00 - Concrete Forming and Accessories.

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. The following published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work in this Section (latest editions apply).

   3. (PS) - United States Product Standard, PS-1 and PS-2 “Construction and Industrial Plywood.”
   4. (UL) - Underwriters' Laboratories, Inc., “Fire Hazard Classification, FR-S.”
   5. (WCLIB) - West Coast Lumber Inspection Bureau, “Standard Grading Rules No. 17.”
   6. (WWPA) - Western Wood Products Association, “Grading Rules for Lumber.”
   7. (AWPA) - American Wood Preservers Association Standards.
      a. T1 – “Processing and Treatment Standard”
      b. U1 – “User Specification for Treated Wood”

1.3 SUBMITTALS

A. Shop Drawings of all specially fabricated rough hardware.

B. Samples only as requested by the architect.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Provide proper facilities for handling and storage of materials to prevent damage to edges, ends, and surfaces.

B. Keep materials dry. Where necessary, stack materials off ground on level flat forms, fully protected from weather.

1.5 JOB CONDITIONS

A. Environmental Requirements: Maintain uniform moisture content of lumber at not more than 19-percent during and after installation.

B. New lumber adjacent and connected to existing lumber shall have a moisture content of not more than 15 percent at the time of installation.

C. Sequencing, Scheduling: Coordinate details with other Work supporting, adjoining or fastening to rough carpentry Work.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Rough Carpentry:

1. Sills on Concrete: Douglas Fir with Preservative Treatment.

2. Lumber (Wood Framing): Minimum grades shall be as shown in the structural drawings.

3. Plywood: Provide thickness, grade, and panel identification index shown on drawings. For plywood thickness 5/32 or greater provide a minimum of 5 ply.

B. Rough Hardware: All exterior hardware shall be hot-dipped galvanized.

1. Nails: Common wire per ASTM F1667, typical; hot-dipped zinc-coated galvanized, stainless steel, silicon bronze, or copper at exposed conditions, fire-retardant-treated, and preservative-treated lumber.

2. Expansion Bolts: Reverse cone, self-wedging, expansion type. Tightening of nut or increased tension on bolt shank shall act to force wedges outward to create
positive increased resistance to withdrawal, Simpson Strong-Bolt, Hilti Kwik-Bolt TZ, or equal product substituted per Section 01630.

3. Metal Framing Connectors: Fabricate from hot-dipped galvanized steel (G90 coating). Connectors in contact with preservative-treated lumber shall have G185 hot dipped galvanized coating per ASTM A653. Connectors in contact with fire-treated lumber or are in high corrosive environments shall be manufactured with Type 316L stainless steel. Connectors shall be at least 16-gauge material, 1/8-inch plate materials where welded, unless otherwise shown or specified, punched for nailing. Nails and nailing shall conform to the manufacturer’s instructions, including coating and material where applicable, with a nail provided for each punched nail hole. Use maximum nail size listed by manufacturer. Manufactured by Simpson Company or equal product substituted per Section 01630.

4. Miscellaneous Hardware: Provide all common screws, bolts, fastenings, washers and nuts required to complete rough carpentry Work.

5. Bolts and sill bolts in wood shall be ASTM A307 with standard cut threads; full diameter bolts (no rolled or “upset” threads permitted) per ANSI/ASME standard B18.2.1.

6. Fasteners used for attachment of exterior wall coverings shall be hot-dipped zinc-coated galvanized steel, mechanically deposited zinc-coated steel, stainless steel, silicon bronze, or copper. The coating weights for hot-dipped zinc-coated fasteners shall be in accordance with ASTM A153. The coating weights for mechanically deposited zinc-coated fasteners shall be in accordance with ASTM B695, Class 55 minimum.

7. Shear wall foundation anchor bolt washers shall conform to the requirements of CBC Section 2305.3.11.

2.2 TREATMENTS

A. Fire-Retardant Treatment: Furnish in accordance with AWPA Standards T1, U1, and P17, “Fire Retardant Formulations.”

B. Preservative Treatment: Furnish in accordance with AWPA Standards T1 and U1. Preservatives with an ammonia base, including Ammoniacal Copper Zinc Arsenate (ACZA) are not permitted.

2.3 FABRICATION

A. Preparation:

1. Verify measurements at job site.

2. Verify details and dimensions of equipment and fixtures integral with finish carpentry for proper fit and accurate alignment.
3. Coordinate details with other work supporting, adjoining, or fastening to casework.

B. Lumber:
   1. Air- or kiln-dry to maximum 19-percent moisture content at time of surfacing.
   2. Furnish surfaced four sides, S4S, unless otherwise noted.
   3. Size to conform with rules of governing standard. Sizes shown are nominal unless otherwise noted.

C. Wood Treatments:
   1. Fire-Retardant Treatment:
      a. Treat in accordance with AWPA Standards T1 and U1 and approved manufacturer’s recommendations. Verify AWPA Use Category with proposed application prior to selected preservative. Fire treated lumber shall conform to the requirements of CBC Section 2303.2.
   
   2. Preservative Treatment:
      a. Treat lumber and plywood sheathing that is:
         i. In contact with concrete and masonry less than six feet above the ground.
         ii. Exposed to weather permanently.
         iii. Where specified in the Contract Documents.
      b. Treat in accordance with AWPA Standards T1 and U1. Verify AWPA Use Category with proposed application prior to selecting preservative.
      c. Treated lumber shall be marked per CBC Section 2303.1.8.1.
      d. After Treatment and prior to shipping, air- or kiln-dry lumber to maximum 19-percent moisture content.

2.4 SOURCE QUALITY CONTROL

A. Lumber shall bear grade-trademark or be accompanied by certificate of compliance of appropriate grading agency.

B. Plywood shall bear APA grade-trademark.

PART 3 – EXECUTION

3.1 EXAMINATION
Contra Costa Community College District
Contra Costa College
C-633 – Seismic Retrofit, Project 1
A. Examine areas to receive rough carpentry Work and verify following:

1. Completion of installation of building components to receive rough carpentry Work.

2. That surfaces are satisfactory to receive Work.

3. That spacing, direction, and details of supports are correct to accommodate installation of blocking, backing, stripping, furring and nailers.

4. That all anchor bolts and holdown bolts are properly installed.

3.2 INSTALLATION

A. Cutting: Perform all cutting, boring, and similar Work required.

B. Studs, Joists, Beams, and Posts: Install all members true to line. No wood shingle shims are permitted. Place joists with crown up; maximum 1/4-inch crown permitted.

C. Nail joints in accordance with applicable requirements of the CBC Table 2304.9.1 unless otherwise shown or specified. Predrill where nails tend to split wood. Nails into preservative-treated lumber shall be hot-dipped galvanized.

D. Bolt holes to be 1/16-inch oversize. Threads shall not bear on wood. Use standard malleable iron washers against wood. Carriage bolts require washers under the nut only.

E. Provide blocking, grounds, nailers, stripping, and backing as shown and as required to secure other Work.

F. Adjoining sheathing panel edges shall bear and be attached to the framing members. Nails shall be placed not less than 3/8-inch from the panel edge.

G. Plywood flooring shall be field glued with adhesive meeting APA specification AFG-01 applied in accordance with the manufacturer’s recommendations. Apply continuous line of glue on joists and in groove of tongue and groove panels.

H. Protect preservative-treated and fire-treated lumber per APWA Standard M4, “Standard for the Care of Preservative-Treated Wood Products.”

I. Where wood is cut, sawed, planed, bored or marred after preservative or fire-retardant treatment, apply two heavy brush coats of same material used in treatment.

J. Nail heads shall be driven flush with plywood surface. Overdriven nails (nails which fracture the outer ply layer) shall be replaced one for one.

K. Screws (Wood or Lag): Screws shall be screwed and not driven into place. Screw holes for the unthreaded portion shall be predrilled to the same diameter and depth of shank.
Holes for threaded portion shall be predrilled less than or equal to the diameter of the root of the thread. Provide standard cut washers under head of lag screws.

L. Sheathing used for diaphragms and shear walls that are part of the seismic-force-resisting system shall be applied directly to framing members. Sheathing is permitted to be fastened over solid limber planking or laminated decking, provided the sheathing panel joints do not align with the planking or decking joints.

3.3 CLEANING AND ADJUSTING EXPOSED TIMBER

A. Remove damaged or otherwise disfigured portions and replace with new prior to the Owner’s acceptance.

B. Wash finished Work in strict accordance with product manufacturer’s directions and ensure that washed surfaces do not differ from clean unwashed surfaces. Any difference will be considered unsatisfactory work.

3.4 FIELD QUALITY CONTROL

A. The Owner’s Testing Agency shall:

1. Inspect erected timber framing as required to establish conformity of work with Drawings.

2. Inspect all timber connectors per CBC Section 1704A.6.3.

3. Inspect high load diaphragm nailing and support framing per CBC Section 1704A.6.1.

4. Inspect elements of the seismic lateral force resisting system per CBC Section 1707A.3.

   a. Inspect floor and roof diaphragm nailing for nail size, spacing and penetration at plywood panel edges, and special nailing at collector and drag members.

   b. Inspect shear wall nailing for nail size, spacing, edge distance and penetration at plywood panel edges, and nailing at holdown posts.

   c. Inspect all bolted connections of elements that are part of the seismic lateral force resisting system.

   d. Inspect holdown bolts into wood and concrete.

B. Machine Nailing: Use of machine nailing is subject to a satisfactory jobsite demonstration for each project and the approval of the Project Inspector, the Structural Engineer and DSA. The approval is subject to continued satisfactory performance. If the nail heads penetrate the outer ply more than would be normal for a hand-held
hammer, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory and machine nailing shall be discontinued.
SECTION 06 20 20
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior standing and running trim, wood baseboards, low wall caps, and similar items.

B. Related Sections include the following:
   1. Division 06 10 00 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view, and for plywood backing panels.
   2. Division 09 91 00 Section "Painting" for priming and backpriming of interior finish carpentry.

1.2 DEFINITIONS

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. WCLIB: West Coast Lumber Inspection Bureau.
   2. WWPA: Western Wood Products Association.

B. MDF: Medium-density fiberboard.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

B. Samples:
   1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.4 QUALITY ASSURANCE

A. VOC Content of Interior Adhesives and Sealants:
   1. Interior Sealants used as Filler: Meet or exceed Bay Area Air Quality Management District Reg. 8, Rule 51 VOC requirements.
   2. Interior Adhesives and Other Sealants: Meet or exceed South Coast Air Quality Management District Rule 1168 VOC requirements.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
   1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
   2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

B. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.2 INTERIOR FINISH CARPENTRY ITEMS

A. Hardwood Lumber for Transparent Finish (Stain or Clear Finish):
   1. Species, Grade, and Cut: Matching existing woodwork.
   2. Maximum Moisture Content: 9 percent.
   5. Veneered Material: Not allowed.
   6. Face Surface: Surfaced (smooth).
   7. Matching: Selected for compatible grain and color.
B. Lumber for Opaque Finish (Painted):
   1. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr finish; NLGA, WCLIB, or WWPA.
   2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
   4. Face Surface: Surfaced (smooth).
   5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.4 FABRICATION

A. Back out or kerf backs of members except those with ends exposed in finished work.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.
3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
   1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
   2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
   3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
   4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related items. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
   1. Match color and grain pattern of items for transparent finish (stain or clear finish) across joints.
   2. Install interior finish carpentry after gypsum board joint finishing operations are completed.
   3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.
3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during remainder of the construction period.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06202
SECTION 07 25 00

Weather Barriers

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building paper.
   2. Flexible flashing.

B. Related Requirements:
   1. Division 06 Section "Gypsum Sheathing" for exterior glass-mat gypsum sheathing beneath weather barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

PART 2 - PRODUCTS

2.1 BUILDING PAPER

A. Building Paper: Per CBC requirements, 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.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Fortifiber Building Systems Group; Fortiflash 40.
      c. Accepted equal.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
C. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistant barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistant barrier as follows:
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.

C. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's 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 water-resistant barrier at bottom and sides of openings.
4. Lap water-resistant barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 07250
SECTION 07 46 00

FIBER CEMENT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fiber-cement wall and soffit panels.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry," for exterior sheathing and wood furring.
   2. Division 07 Section "Self-Adhering Sheet Wall Membranes," for underlayment materials installed beneath fiber-cement panel assemblies.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for field-formed flashings and other sheet metal work not part of fiber-cement panel assemblies.
   4. Division 07 Section "Joint Sealants," for field-applied sealants not otherwise specified in this Section.
   5. Division 09 Section "Exterior Finish Schedule," for product finish information not specified in this Section.
   6. Division 09 Section "Painting," for field-finishing of fiber-cement panels.

1.2 DEFINITION

A. Fiber-Cement Panel Assembly: Panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.3 PERFORMANCE REQUIREMENTS

A. Provide wall cladding comprising panels, system components, accessories and supports such that the cladding complies with performance requirements indicated below and is capable of withstanding structural movement, thermally induced movement and exposure to weather without failure.

B. Structural Performance: Provide cladding panels and sub framing capable of withstanding design wind loads as indicated on the Drawings.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of fiber-cement panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of fiber-cement panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among
factory-, shop-, and field-assembled work.

C. Samples: For each type and color of exposed finish required, prepared on Samples of size indicated below:
   1. Fiber-Cement Panels: Minimum 12 x 12 inches. Include fasteners, closures, and other fiber-cement panel accessories.
   2. Trim and Accessories: 12 inches long. Include fasteners and other exposed accessories.

D. Qualification Data: For Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

F. Maintenance Data: For metal wall panels to include in maintenance manuals.

G. Warranties: Samples of special warranties.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of fiber-cement panel from single source from single manufacturer.

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Regulatory Requirements: Install fiber-cement panels in accordance with ICC Evaluation Service Report ICC-ES NER-405 and manufacturer’s installation requirements.

D. Mockups: Before installing fiber-cement panels, build mockups to verify selections made under sample submittals and to demonstrate typical attachment methods, joinery, surface finishes, textures, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockup in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Include backup wall framing, sheathing, sheet air barriers, and other contiguous materials, arranged in the same relationship as in the finished construction.
   3. Fabricate, install, and finish materials by those responsible for the permanent work.
   4. Demonstrate typical attachment methods, joints, tolerances, and finishes.
   5. Obtain Architect’s approval of mockup before beginning installation of permanent work.
   6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.
   1. Meet with District’s Representative, Architect, testing and inspecting agency
representative, fiber-cement panel installer, fiber-cement panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects fiber-cement panels including installers of doors, windows, and louvers.

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 fiber-cement panel installation, including manufacturer's written instructions.

4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.

5. Review flashings, special panel details, wall penetrations, openings, and condition of other construction that will affect fiber-cement panels.

6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.

7. Review temporary protection requirements for fiber-cement panel assembly during and after installation.

8. Review wall panel observation and repair procedures after fiber-cement panel installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, fiber-cement panels, and other manufactured items so as not to be damaged or deformed. Package fiber-cement panels for protection during transportation and handling.

B. Unload, store, and erect fiber-cement panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store fiber-cement panels to ensure dryness, with positive slope for drainage of water. Do not store fiber-cement panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of fiber-cement panels to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before fiber-cement panel fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate fiber-cement panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.
1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fiber-cement panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including rupturing, cracking, warping, spalling, peeling, or puncturing.
      b. Deterioration of surfaces and other materials beyond normal weathering, including efflorescence, fading, and discoloration.
   2. Warranty Period: Thirty years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT PANELS

A. General: Provide factory-formed fiber-cement panels, formed into profiles for installation method indicated. Include attachment system components and accessories required for weathertight system.

B. Basis-of-Design Products: The design for fiber-cement panels is based on products by James Hardie Building Products, Inc.
   1. Subject to compliance with requirements, provide the named products or comparable products by an accepted equal manufacturer.

C. Standard Wall Panels:
   1. Basis-of-Design Product: The design for standard fiber-cement wall panels is based on James Hardie Building Products, Inc.'s "HardiePanel HZ10" vertical siding.

D. Rainscreen Wall Panels:
   1. Basis-of-Design Product: The design for rainscreen fiber-cement wall panels is based on James Hardie Building Products, Inc.'s "Hardie Reveal Panel HZ10."

E. Soffit Panels:
   2. Panel Thickness: 1/4-inch.

2.2 MISCELLANEOUS MATERIALS
A. Fasteners: Self-tapping, stainless-steel screws and other suitable fasteners as indicated or as recommended by the manufacturer. Provide exposed fasteners with heads matching type as selected by the Architect.

2.3 ACCESSORIES

A. Panel Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as indicated and as recommended by panel manufacturer for configuration indicated.
1. Provide accessories made from same material as, and matching color and texture of, adjacent panels unless otherwise indicated.

B. Rainscreen Reveal Trims: Reveal trims in the following profiles supplied by manufacturer, conforming to a 6063 alloy in T-5 temper with a minimum thickness of 0.050 inch, and finished with manufacturer’s factory primer for field painting.
1. Horizontal trim.
2. Vertical trim.
3. Outside corner trim.
4. Inside corner trim.
5. J channel trim.
6. Drip cap trim.

C. Flashing and Trim: Formed from 0.018-inch- minimum thickness, 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, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers.

2.4 FABRICATION

A. General: Fabricate and finish fiber-cement panels and accessories at the factory to greatest extent possible, by manufacturer’s standard procedures and processes.

B. Sheet Metal Accessories: Fabricate 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.
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.
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 recommended by fiber-cement panel manufacturer.
a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or fiber-cement panel manufacturer for application, but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, fiber-cement panel supports, and other conditions affecting performance of the Work.
   1. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by fiber-cement panel manufacturer.
   2. Verify that weather-resistant sheet wall membrane has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating fiber-cement panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Coordinate panel installation with rain drainage work, flashing, trim, soffit, roofing, parapet, wall and other adjoining work to provide a leakproof, secure and non-corrosive installation.

3.3 FURRING

A. Install furring as indicated.

3.4 FIBER-CEMENT PANEL INSTALLATION

A. General: Install fiber-cement panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Anchor panels and other components of the Work securely in place.
   1. Commence fiber-cement panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
   2. Shim or otherwise plumb substrates receiving fiber-cement panels, where required.
   3. Install flashing and trim as fiber-cement panel work proceeds.
   4. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
5. Do not install damaged components.
6. Read warranty and comply with all terms necessary to maintain warranty coverage.
7. Install in accordance with conditions stated in model code evaluation-report applicable to location of project.
8. Use trim details indicated on Drawings.
9. Touch up all field cut edges before installing.
10. Pre-drill fastener holes if necessary to prevent breakage.

B. Erect units level, plumb, square, and true within allowable tolerances. Align and maintain uniform horizontal and vertical joints, as erection progresses.

C. Fasten fiber-cement panels through sheathing into studs.

D. Install panels with fasteners spaced as indicated on the Drawings. Align and uniformly space fasteners, horizontally and vertically.

E. Do not install panels closer than distance recommended by manufacturer to roofs and other surfaces where water may collect.

3.5 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.

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.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align fiber-cement panel units within installed tolerance of 1/8 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/16-inch offset of adjoining faces and of alignment of matching profiles. Joint widths shall be within 1/16 of specified widths.

3.7 CLEANING

A. Remove damaged, improperly installed or otherwise defective cladding material and replace with new material. Damage requiring replacement includes, but is not limited, to chips and scratches on panels.

B. Clean finished surfaces according to panel manufacturer's instructions and maintain in a clean condition during construction.

C. Replace fiber-cement panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes
   1. Painted galvanized sheet metal flashing and counterflashing.
   2. Double bottom gutter.
   3. Hard pipe downspout.
   4. Exposed metal trim.
   5. Miscellaneous sheet metal accessories.

B. Products Furnished But Not Installed Under This Section: Sheet metal flashing and trim associated with the following Section.

C. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

D. Related Sections
   1. Section 05 50 00 - Metal Fabrications: Provision of protection of dissimilar metals.

1.02 REFERENCES

A. AAMA - American Architectural Manufacturers Association
   1. 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

B. ASTM - American Society for Testing and Materials
C. AWS - American Welding Society

D. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.

E. SSPC - Steel Structures Painting Council
   1. Paint 12 - Paint Specification No. 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

1.03 SYSTEM DESCRIPTION

A. Performance Requirements
   1. Work of this Section shall physically protect roofing and other items as indicated from damage that would permit water leakage to building interior.
   2. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement and exposure to weather without failing.

1.04 SUBMITTALS

A. Setting Drawings or Templates: Submit setting drawings or templates and setting instructions, for exact locations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Metal Flashing and Trim Materials
   1. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A526 except ASTM A527 for lock-forming, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 20 gauge except as otherwise indicated.

B. Elastic Sheet Flashing/Membrane
   1. Nonreinforced flexible, black elastic sheet flashing of 50 to 60 mils thickness.

C. Elastic Sheet Flashing Membrane: Self-adhering flashing comprised of high-density, polyethylene carrier film pressure sensitive adhesive layer, as manufactured by W.R. Grace, “Vycor Plus”; Tyco Plastics and Adhesives, “Polyken 627-20 Black Window Flashing Tape”, or equal.

D. Surface Reglet and Counterflashimg: As manufactured by Fry Reglet, “Type SM”, or approved equal, except as otherwise indicated.

E. Miscellaneous Materials and Accessories
   1. Solder and Flux: For use with steel, provide 50 - 50 tin/lead solder, ASTM B32, with rosin flux. Re-melted or reworked solder will not be permitted.
2. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

3. Bituminous Coating: SSPC Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat.

4. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.

5. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.


F. Materials for Permanent Protection of Dissimilar Materials: As specified in Section 05500.

2.02 FABRICATION

A. Shop Assembly
1. Design and fabricate work in accordance with SMACNA, unless otherwise indicated.
2. As far as practicable, form and fabricate sheet metal in shop. Where on-site fabrication is required, provide work equal to shop quality. Additionally, identify bulk materials from which items are field fabricated by manufacturer's trademark printed or embossed at frequent intervals.
3. Reproduce accurately profiles and bends indicated.
4. Provide profiles with interactions that are sharp, even and true; with plane surfaces free from buckles and waves; and seams that follow direction of water flow.
5. Reinforce correctly for strength and appearance.
6. Cut, fit, and drill sheet metal as required to accommodate related, adjacent or adjoining work.
7. Exposed Edges of Sheet Metal: Fold, bend or return exposed edges of sheet metal. Raw edges will not be permitted.
8. Form pieces in longest practical lengths.

B. Sheet Metal Joints
1. In general, provide lock joints; where impractical, lap, rivet, solder, or weld joints, or join as otherwise recommended by manufacturer.
2. Join joints and miters as recommended by manufacturer.
3. Where positive joining is required, weld in accordance with applicable AWS standards.
4. Turn lock joints on exposed surfaces in direction of flow.

C. Soldering
1. Neatly solder exposed surfaces.
2. Pre-tin edges minimum 1-1/2 inches both sides prior to soldering.

D. Expansion and Contraction of Sheet Metal Runs
1. General: Provide loose locking slip joint of maximum 8 feet from external and internal corners, maximum 24 feet length of straight runs, unless manufacturer recommends more frequent interval, and 1 at center of runs less than 20 feet, but more than 8 feet, unless specified otherwise following herein.

E. Provide the following items of materials and minimum gauges as indicated:
1. Cleats: Formed of same metal as that being anchored, with size, shape, and quantity as required to secure flashing and sheet metal work in place.
2. Base Flashing, Counter Flashing and Roof Penetration Flashing
   a. Formed with 3/4-inch locked and soldered seams, assembled into units not longer than 16 feet.
   b. Join units with 3/4-inch wide loose locked seams filled with soft grade butyl base compound, before units are assembled.
   c. Mitre corners and joints by riveted or locked and soldered joints.

2.03 FINISHES

A. Galvanized Sheet Metal
1. Factory Finishing
   a. Finish: G90, conforming to ASTM A525.
   b. After Fabrication: Touch-up abraded surfaces in accordance with Section 09900.
2. Finish Painting: As specified in Section 09900.

B. High-Performance Organic Finish: As specified in Section 07610.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Conform with procedures and methods of installation and applicable details shown and described in SMACNA Manual.

B. Where installation requires fabrication at the Project site, conform to applicable requirements of Article titled “Fabrication” in this Section.

C. Install standard catalog products in accordance with manufacturer’s instructions, unless otherwise indicated.

D. Install work watertight; ensure that items are installed in true and accurate alignment with other items and related work, that joints are accurately fitted, that corners are reinforced and that exposed surfaces are free of dents.

E. Apply flashing compound at slip joints or wherever metal-to-metal contact occurs and movement may be anticipated to occur.

F. Flashings
1. Fasten sheet metal runs to underlaying material by nailing through slotted holes in flange at 3 inches on center, unless otherwise indicated or required by manufacturer.
2. Provide waterproof washers wherever fasteners penetrate flashings.

G. Coping: Provide with butt seam with backup plates every 10 feet, fastened in accordance with SMACNA.

3.02 ADJUSTING

A. Replace damaged material with new.

3.03 SCHEDULE

A. Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

1. Double Bottom Gutter: Galvanized steel, 0.0276-inch thick.
2. Hard Pipe Downspout: Galvanized steel, 0.0217-inch thick.
3. Exposed Trim, Except as Indicated: Galvanized steel, 0.0276-inch thick.
4. Base Flashing: Galvanized steel, 0.0276-inch thick.
5. Counterflash: Galvanized steel, 0.0217-inch thick.
6. Flashing Receivers: Galvanized steel, 0.0217-inch thick.
7. Drip Edges: Galvanized steel, 0.0217-inch thick.
8. Eave Flashing: Galvanized steel, 0.0217-inch thick.
9. Equipment Support Flashing: Galvanized steel, 0.0276-inch thick.
10. Roof Penetration Flashing: Galvanized steel, 0.0276-inch thick.
11. Cap Flashing and Fascia: Galvanized steel, 0.0516-inch thick.
12. Coping: Galvanized steel, 0.0276-inch thick.

END OF SECTION
SECTION 07 92 10

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following applications:
   1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
   2. Exterior joints in horizontal traffic surfaces.
   3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   4. Interior joints in horizontal traffic surfaces.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight
   continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Certifications:
   1. Furnish manufacturer’s certification that joint sealers comply with Contract Documents
      and are suitable for Project applications.
   2. Furnish certification indicating Installers are trained in proper use of specified products,
      qualified, and familiar with proper installation techniques.

C. 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.

1.4 QUALITY ASSURANCE

A. VOC Content of Interior Adhesives and Sealants:
   1. Interior Sealants used as Filler: Meet or exceed Bay Area Air Quality Management
      District Reg. 8, Rule 51 VOC requirements.
   2. Interior Adhesives and Other Sealants: Meet or exceed South Coast Air Quality
      Management District Rule 1168 VOC requirements.

B. Installer Qualifications: Firm with minimum five years successful experience on projects of
   similar type and size, using specified products.
C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, cure time, and mixing instructions.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent deterioration or damage due to moisture, high or low temperatures, contaminates, or other causes.

1.6 SITE CONDITIONS

A. Do not proceed with installation of joint sealants under unfavorable weather conditions.

B. Install joint sealants when temperature is in lower third of temperature range recommended by manufacturer.

1.7 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 Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Ten years from date of Substantial Completion for exterior sealants, two years for interior sealants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 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.

B. Colors of Exposed Joint Sealants: Custom colors as selected by the Architect.
1. Provide multiple colors for each sealant type as selected by the Architect and as required to coordinate with colors and finishes of adjacent materials. Where two sealant colors intersect, provide clean, square-cut tooled joint per manufacturer’s recommendations.

2.3 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. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Building Sealant:
   2. Application: General exterior building use where a specific type is not otherwise identified.
   3. Products:
      a. Dow Corning Corporation; 795.
      b. GE Advanced Materials - Silicones; SiPruf SCS2000.
      c. Tremco Incorporated; Spectrem 2 or Spectrem 3.
      d. Accepted equal.
   4. Type and Grade: S (single component) and NS (nonsag).
   5. Class: 50.
   6. Use Related to Exposure: NT (nontraffic).
   7. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

D. Sanitary Sealant:
   2. Application: Interior wet areas.
   3. Products:
      a. Dow Corning Corporation; 786 Mildew Resistant.
      b. GE Advanced Materials - Silicones; Sanitary SCS1700.
      c. Tremco Incorporated; Tremsil 200 Sanitary.
      d. Accepted equal.
   4. Type and Grade: S (single component) and NS (nonsag).
   5. Class: 25.
   6. Use Related to Exposure: NT (nontraffic).
   7. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

E. Traffic Sealant:
2. Application: Exterior and interior horizontal joints subject to traffic.
3. Products:
   a. BASF Building Systems; Sonolastic SL 1.
   b. Pecora Corporation; Urepxpan NR-201.
   c. Tremco Incorporated; Vuilkem 45.
   d. Accepted equal.
4. Type and Grade: M (multicomponent) and P (pourable).
5. Class: 25.
6. Use Related to Exposure: T (traffic).
7. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated,
   O.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type OP, Grade NF.

B. Application: Interior non-wet areas.

C. Products:
   1. BASF Building Systems; Sonolac.
   3. Tremco Incorporated; Tremflex 834.
   4. Accepted equal.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard 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.
   1. Products:
      a. Pecora Corporation; AC-20 FTR.
      c. Accepted equal.

B. Outlet Box Sealant: Resilient sealer pads; use to seal back and sides of all junction boxes
   recessed in acoustically-rated partitions.
   1. Fire-Rated Partitions: Hevi-Duty Nelson FSP Firestop Putty Pads, or equal (no known
equal).
   2. Non-Fire-Rated Partitions: Lowry's Outlet Box Pad, or equal (no known equal).

2.6 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 C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   1. Oversize cylindrical backings 30-50 percent of joint opening, minimum.

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.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Non-staining 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: Non-corrosive 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

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants 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.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
      a. 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.
   2. Remove laitance and form-release agents from concrete.
a. 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.

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.

3.3 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications 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.

G. 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.

H. Outlet Boxes: Seal back of outlet boxes airtight with outlet box sealant.

3.4 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, remove, and replace damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 07921
SECTION 08 11 13
HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Custom hollow metal frames.

B. Related Sections:
   1. Division 08 21 00 Section "Wood Doors" for existing wood doors to be reinstalled in hollow metal frames.
   2. Division 09 91 00 Section "Painting" for field painting hollow metal frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:
   1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   2. Locations of reinforcement and preparations for hardware.
   3. Details of each different wall opening condition.
   4. Details of anchorages, joints, field splices, and connections.
   5. Details of accessories.

C. Samples:
   1. For the following items, prepared on Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:
      a. Frames: Show profile, corner joint, floor and wall anchors, and silencers.

D. Other Action Submittals:
   1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal frame assembly.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work 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 units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

E. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

G. 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 hollow metal frames of type indicated.

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-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.2 CUSTOM HOLLOW METAL FRAMES


1. Interior Door Frames:
   a. Door Frames for Openings 48 Inches Wide or Less: Fabricated from 0.053-inch-thick, cold-rolled steel sheet.
   b. Door Frames for Openings More Than 48 Inches Wide: Fabricated from 0.067-inch-thick, cold-rolled steel sheet.

B. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as frame.

C. Head Reinforcement: Provide minimum 0.093-inch-thick, steel channel or angle stiffener for openings widths more than 48 inches.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

2. 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.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, 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.
2.4 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

2.5 ACCESSORIES

A. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch wide steel.

2.6 FABRICATION

A. Fabricate hollow metal work 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. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.

C. Hollow Metal 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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
   4. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. 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 high.
         2) Four anchors per jamb from 60 to 90 inches high.
         3) Five anchors per jamb from 90 to 96 inches high.
         4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
         5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
      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.

5. Door Silencers: Drill stops to receive door silencers as follows. 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. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
E. Hardware Preparation: Factory prepare hollow metal work 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 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/NAAMM-HMMA 861. Where frames are indicated to receive existing doors, locate hardware to accommodate existing doors.
2. Reinforce frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

F. Stops and Moldings: Provide stops and moldings where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide fixed frame moldings on secure side of interior frames.

2.7 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2. Second Coat and Top Coat: Specified in Division 09 Section "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness 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 frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with HMMA 840.
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. Where frames are fabricated in sections because of 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.
   b. Install frames with removable glazing stops located on secure side of opening.
   c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   d. Check plumbness, 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 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.
4. 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.
5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Installation Tolerances: Adjust hollow metal 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.

3.4 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 hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08113
SECTION 08 21 00
WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid-core doors with medium-density-overlay faces.
   2. Installing salvaged solid core wood doors in new hollow metal frames.

B. Related Sections:
   1. Division 08 11 13 Section "Hollow Metal Frames" for frames to receive existing wood doors.
   2. See door schedule and sheet for door hardware groups.
   3. Division 09 91 00 Sections “Painting” for refinishing of existing doors.

1.2 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

B. Preinstallation Conference: Conduct conference at Project site.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 02 Section “Selective Structure Demolition.”

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by a fabricator who is a licensee of WI’s Certified Compliance Program.

2.2 DOOR CONSTRUCTION, GENERAL
A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Applicable Quality Standard: WI Section 12; Architectural Wood Doors - Flush.

C. Particleboard-Core Doors:
   1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde resin.
   2. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

2.4 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:
   1. Grade: Custom.
   2. Faces: Medium-density overlay.
   5. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.1 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: WI System 4 clear conversion varnish or 5 catalyzed polyurethane.

D. Opaque Finish:
   1. Grade: Custom.
   2. Finish: WI System 4 conversion varnish or 5 catalyzed polyurethane.
   3. Color and Sheen: As specified in Division 09 Section “Interior Finish Schedule” and indicated on the Drawings.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Verify that hardware preparations for frames have been located to accommodate existing doors.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Install doors to comply with the referenced quality standard, and as indicated.

C. Align in frames for uniform clearance at each edge.

3.3 FIELD FINISHING

A. General: As specified in Division 09 Section “Painting.”

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08210
SECTION 09 25 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior gypsum board.
   2. Tile backing panels.

B. Related Requirements:
   1. Division 07 91 10 Section “Joint Sealants” for acoustical sealants installed in gypsum board assemblies.
   2. Division 09 91 00 painting Sections for primers applied to gypsum board surfaces.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
   1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.3 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, 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 the following:
      a. Each level of gypsum board finish indicated for use in exposed locations.
   2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
   3. Simulate finished lighting conditions for review of mockups.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. VOC Content of Interior Adhesives and Sealants:
   1. Interior Sealants used as Filler: Meet or exceed Bay Area Air Quality Management District Reg. 8, Rule 51 VOC requirements.
   2. Interior Adhesives and Other Sealants: Meet or exceed South Coast Air Quality Management District Rule 1168 VOC requirements.
1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Georgia-Pacific Gypsum LLC.
   3. PABCO Gypsum.
   4. Temple-Inland.
   5. USG Corporation.
   6. Accepted equal.
B. Regular-Type Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thicknesses: 1/4 inch and 1/2-inch.
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Fire-Rated Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

D. Water-Resistant, Fire-Rated Type: ASTM C 630/C 630M or ASTM C 1396/C 1396M.
   1. Core: 5/8 inch, Type X.
   2. Long Edges: Tapered.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; GlasRoc Tile Backer.
      b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
      d. Accepted equal.
   2. Core: 5/8 inch, Type X.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. Expansion (control) joint.
      d. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Fry Reglet Corp.
      b. Gordon, Inc.
      c. Pittcon Industries.
      d. Accepted equal.
   2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
   3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.
2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, 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.
   5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:
   1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.7 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 to 0.112 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install 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.

D. 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.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support 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 structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control 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 with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Regular Type: Where indicated on the Drawings.
2. Fire-Rated Type: Throughout, unless otherwise indicated.
3. Water-Resistant Type: Where indicated on the Drawings.

B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular 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 panels.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. 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.
3. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. 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.

E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

A. Tile Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile, and non-wet locations as indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 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 according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

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, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 0: In areas of temporary construction.
   2. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   3. Level 2: Panels that are substrate for tile.
   4. Level 3: Not used.
   5. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated, but excluding panel surfaces that are scheduled to receive paints with semi-gloss or gloss sheen.
      a. Primer and its application to surfaces are specified in other Division 09 Sections.
   6. Level 5: At panel surfaces that are scheduled to receive paints with semi-gloss or gloss sheen, and where otherwise indicated on Drawings.
      a. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Tile Backing Panels: Finish according to manufacturer's written instructions.
   1. Where exposed, finish according to manufacturer's written instructions for use as exposed board.
3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250
SECTION 09 51 10
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections:
   1. None.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Ceiling suspension system members.
   2. Method of attaching hangers to building structure.
   3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

C. Structural Design Calculations: Retain and pay for services of a qualified structural engineer, licensed in the State of California, to prepare calculations and drawings for specified systems, acceptable to authorities having jurisdiction, including all connections between members of system and all connections to building structure.

D. Samples: 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.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system 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 California Building Code requirements.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1.4 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.

1.5 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. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.6 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.
1.7 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. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
   3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 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.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

   a. Basis-of-Design Manufacturers: USG, Armstrong World Industries, Inc. or equal
   b. Product: Cortega
   c. Edge Profile: Square lay-in
   d. Thickness: 5/8”.
   e. Modular Size: 2’x4’.

B. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. Accepted equal.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. 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.

C. 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.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, loads indicated or as required by applicable codes, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
   a. Type: Postinstalled expansion anchors. 
b. 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.

2. Power-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 hangers of type indicated, and with capability to sustain, without failure, loads indicated or as required by applicable codes, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   2. Size: As indicated.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

I. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Manufacturers, Products, Patterns, Sizes, and Colors: As specified in Division 09 Section "Interior Finish Schedule" and indicated on the Drawings.

B. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. Accepted equal.

C. Grid: Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G60 coating designation, with prefinished, cold-rolled, 15/16-inch-wide, aluminum caps on flanges.
   1. Structural Classification: Heavy-duty system.
   2. Face Design: Flat, flush.
   3. Face Finish: Painted white.
2.5 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Manufacturers, Products, Patterns, Sizes, and Colors: As indicated on the Drawings.

B. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   1. Accepted equal.

C. 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 comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
   1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
   2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
   3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 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.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with 2010 CBC requirements and seismic design requirements indicated, 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.

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.

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. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

7. Do not attach hangers to steel deck tabs.

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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

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.

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.

2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

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. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.

2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

3. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 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 09 65 10

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes linoleum floor tile.

B. Related Sections:
   1. Division 09 65 30 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.2 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For resilient tile flooring installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM D 2047:
   1. Level Surfaces: Minimum 0.6.
   2. Ramp Surfaces: Minimum 0.8.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor tile required.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to
ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

C. VOC Content of Interior Adhesives and Sealants:
1. Interior Sealants used as Filler: Meet or exceed Bay Area Air Quality Management District Reg. 8, Rule 51 VOC requirements.
2. Interior Adhesives and Other Sealants: Meet or exceed South Coast Air Quality Management District Rule 1168 VOC requirements.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for floor tile including resilient base and accessories.
   a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Maintain ambient 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. Until Substantial Completion, maintain ambient 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 tile installation.

D. Close spaces to traffic for 72 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
PART 2 - PRODUCTS

2.1 LINOLEUM FLOOR TILE

A. Linoleum Floor Tile: ASTM F 2195.
   1. Basis-of-Design Manufacturers: Forbo, Marmoleum Dual tile, 13”x13”
      a. Select from full range of colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based
   or blended hydraulic-cement-based formulation provided or approved by manufacturer for
   applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and
   substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with installer present, for compliance with requirements for
   maximum moisture content and other conditions affecting performance of the Work.

B. 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 tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer’s written instructions to ensure
   adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. 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.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
      Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows.
      Proceed with installation only after substrates pass 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.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. For wood subfloors, verify the following:
   1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
H. Adhere floor tiles to flooring 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.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile 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.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover floor coverings until Substantial Completion.

END OF SECTION 09651
SECTION 09 65 30
RESILIENT BASE & ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

B. Related Sections:
   1. Division 09 65 10 Section Resilient Tile flooring.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: 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.

C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. VOC Content of Interior Adhesives and Sealants:
   1. Interior Sealants used as Filler: Meet or exceed Bay Area Air Quality Management District Reg. 8, Rule 51 VOC requirements.
   2. Interior Adhesives and Other Sealants: Meet or exceed South Coast Air Quality Management District Rule 1168 VOC requirements.

C. Mockups: Provide resilient products with mockups specified in other Sections.

1.4 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.
1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient 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.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:
   1. Basis-of-Design Manufacturers: Burke, 4" rubber cove base, select from full range of standard colors.
   2. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
      a. Accepted equal.

   1. Material Requirement: Type TS (rubber, vulcanized thermoset).

C. Minimum Thickness: 0.125 inch.

D. Heights: As indicated on the Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.
2.2 RESILIENT MOLDING ACCESSORIES

A. Resilient Molding Accessories:
1. Basis-of-Design Manufacturers, Products, Patterns, and Colors: As specified in Division 09 Section "Interior Finish Schedule" and indicated on the Drawings.
2. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
   a. Accepted equal.

B. Description: Stair nosings, edges, reducer strips, joiners, transition strips, or other shapes as indicated or as required.

C. Material: Rubber.

D. Profile and Dimensions: As indicated or as required.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. 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.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. 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.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass 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.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer’s written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On irregular substrates, fill voids along top edge of resilient base with manufacturer’s recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible. "V" cut back of base to two-thirds of its thickness and fold. Form without producing discoloration (whitening) at bends.

H. Exposed Ends: Use preformed units.
3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. 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.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. 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.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653
SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

B. Related Sections:
   1. Division 07 92 10 Section “Joint Sealants” for product information not specified in this Section.

C. See Drawings for exterior finish information not specified in this Section.

1.2 SYSTEM DESCRIPTION

A. General: Paint every exterior and interior surface in areas affected by construction activities, or as otherwise indicated.

B. Surfaces Not to be Painted:
   1. Factory-finished items specified in various Sections.
   2. Prefinished wall, ceiling, and floor coverings.
   3. Painting specified elsewhere and included in respective Sections, including but not necessarily limited to, shop priming.
   5. Surfaces concealed in walls and above ceilings except as specifically indicated otherwise.
   6. Ducts, piping, conduit, and equipment concealed in walls and ceilings, unless specifically indicated otherwise.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each type of paint system and in each color and gloss of topcoat indicated.
   1. Submit Samples on rigid backing, 8-1/2 inches by 11 inches.
   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.
1.4 QUALITY ASSURANCE

A. Applicators Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent.

B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommended limits.

C. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.

D. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.
   1. Comply with current applicable regulations of the local air quality district, California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).
   2. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to start of painting.

E. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required until required sheen, color and texture is obtained. Comply with procedures specified in PDCA P5. Simulate finished lighting conditions for review of in-place work.
   1. Wall Surfaces: Provide samples on at least 100 sq. ft.
   2. Small Areas and Items: Architect will designate items or areas required.
   3. Final approval of colors will be from benchmark samples.

1.5 PROJECT CONDITIONS

A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
   1. Quantity: 1 gal. of each material and color applied.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Products of the following manufacturers are listed in other Part 2 articles and use the abbreviated names shown in parentheses:
1. Benjamin Moore & Co. (Benjamin Moore).
2. Devoe Coatings (Devoe).
4. Frazee Paint Company (Frazee), a Comex Group Company.
5. Gemini Coatings (Gemini).
8. Precision Coatings, Inc. (PCI).
9. Rust-Oleum Brands (Rust-Oleum).
12. United Gilsonite Laboratories (UGL).

B. Subject to compliance with requirements, provide the named products or comparable products by an accepted equal manufacturer.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer’s top-of-the-line-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer’s product identification will not be acceptable.

C. Exterior Colors: As indicated on the Drawings.

D. Interior Colors: As specified in Division 09 Section “Interior Finish Schedule” and indicated on the Drawings.

2.3 PREPARATORY COATS

A. Crack Fillers: Factory-formulated acrylic emulsion crack fillers compatible with substrate and finish-coat materials indicated.

B. Exterior Primers: Exterior latex-based primers of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   a. Benjamin Moore; 066 Moore’s Acrylic Masonry Sealer.
   b. Dunn – Edwards; ESPR00 Eff-Stop.
   c. Frazee; 266 Epotil, or C251 Ultra Tech.
d. Glidden; 3030 Bond-Prep.
e. Kelly-Moore; 247 Acry-Shield.
f. Sherwin-Williams; A24W300 Loxon.

C. Interior Primers: Interior latex-based primers of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   a. Benjamin Moore; 372 Eco Spec WB.
   b. Dunn - Edwards; W600 EcoShield.
   c. Frazee; 066 Envirokote, or C153 Ultra Tech.
   d. Glidden; 9116 Lifemaster.
   e. Kelly-Moore; 973 Acry-Plex.
   f. Sherwin-Williams; B11W900 Harmony.
2. Ferrous-Metal, Zinc-Coated Metal, and Aluminum Substrates: Rust-inhibitive acrylic metal primer.
   a. Benjamin Moore; P04 Super Spec HP.
   b. Dunn – Edwards; UGPR00 Ultra-Grip.
   c. Frazee; 561 Acrylic Metal Prime, or C309 Ultra Tech.
   d. Glidden; 4020PF Devflex.
   e. Kelly-Moore; 1725 Acry-Shield.
   f. Sherwin-Williams; B66W1 DTM.
3. Plaster and Concrete Substrates:
   b. Dunn – Edwards; W6232V Acri-Loc.
   c. Frazee; 065 Acry-Prime, or C152 Ultra Tech.
   d. Glidden; 3030 Bond-Prep.
   e. Kelly-Moore; 247 Acry-Shield.
   f. Sherwin-Williams; B28W101 PrepRite.
4. Wood Substrates (Smooth or Synthetic): Acrylic stain blocking primer.
   a. Benjamin Moore; 046 Fresh Start.
   b. Dunn – Edwards; IKPR00 Inter-Kote.
   c. Frazee; 168 Prime+Plus, or C312 Ultra Tech.
   d. Glidden; 3210 Gripper.
   e. Kelly-Moore; 255 Acry-Shield.
   f. Sherwin-Williams; B28W101 PrepRite.

2.4 EXTERIOR FINISH COATS

A. Exterior Flat Acrylic Paint:
   1. Benjamin Moore; 105 MoorLife.
   2. Dunn – Edwards; EVSH10 Evershield.
   3. Frazee; 203 Duratec.
   5. Kelly-Moore; 1240 Acry-Shield.

B. Wood Stain:
   1. Gemini; 6707 Gem-Glo alkyd wiping stain.
2. UGL; Zar wood stain.

   1. Gemini; WB-0230 waterborne acrylic/urethane clear satin finish.

   1. Gemini; WB-0260.

2.5 INTERIOR FINISH COATS

A. Interior Flat Zero VOC/Low Odor Acrylic Paint:
   1. Benjamin Moore; 373 Eco Spec WB.
   2. Dunn-Edwards; W601 EcoShield.
   3. Frazee; 018 Environkote, or C129 Ultra Tech.
   4. Glidden; 9100 Lifemaster.
   5. Kelly-Moore; 1500 Enviro Coat.

B. Interior Low-Sheen Zero VOC/Low Odor Acrylic Enamel:
   1. Benjamin Moore; 374 Eco Spec WB.
   2. Dunn-Edwards; W602 EcoShield.
   3. Frazee; 029 Environkote, or C132 Ultra Tech.
   4. Glidden; 9300 Lifemaster.
   5. Kelly-Moore; 1510 Enviro Coat.
   6. Sherwin-Williams; B9 Series Harmony.

C. Interior Semigloss Zero VOC/Low Odor Acrylic Enamel:
   1. Benjamin Moore; 376 Eco Spec WB.
   2. Dunn-Edwards; W603 EcoShield.
   3. Frazee; 032 Environkote, or C136 Ultra Tech.
   4. Glidden; 9200 Lifemaster.

D. Interior High Performance Topcoats:
   1. Intermediate Coat: Epoxy intermediate coat as recommended by manufacturer for intended applications.
   2. Topcoats: Semigloss, acrylic polyurethane enamel.
      a. Devoc; Devthane 378H.
      b. PCI; PC3v100.
      c. Tnemec; Series 1075 Endurashield.

E. Wood Stain and Sanding Sealer:
   1. Stain:
      a. Gemini; 6707 Gem-Glo alkyd wiping stain.
      b. UGL; Zar wood stain.
2. Sealer:
   a. Gemini; WBS-0100 clear waterborne sealer.

   1. Gemini; WB-0230 waterborne acrylic/urethane clear satin finish.

   1. Gemini; WB-0250.

PART 3 - EXECUTION

3.1 APPLICATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and reprime.
   2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
      a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
      b. Prime or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides.
   4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

6. Old Work: Sand, wire brush, or scrape painted surfaces to remove loose, scaling paint and to reduce gloss. Wash soiled surfaces.

E. Material Preparation:
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
4. Finish doors on tops, bottoms, and side edges the same as faces.

G. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Omit primer over metal surfaces that have been shop primed and touchup painted.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.

H. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

I. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

J. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

K. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots
or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

L. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

M. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

3.2 CLEANING AND PROTECTING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.3 WASTE MANAGEMENT

A. Set aside extra paint for future color matches, or reuse by Owner. Where paint recycling is available, collect all waste paint by type and provide for delivery to recycling or collection facility.

B. Close and seal tightly all partly used paint and finish containers and store protected in well-ventilated fire-safe area at moderate temperature.

C. Place empty containers of solvent based paints in areas designated for hazardous materials.

D. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

3.4 EXTERIOR PAINT SCHEDULE

A. Cement Plaster:
   1. Acrylic Finish: Two finish coats over a primer.
      a. Primer: Exterior primer as specified for substrate indicated.

B. Wood - Transparent Finish:
   1. Existing Wood, Including Wood Doors: After removal of existing varnish or other clear finishes:
a. Wood Stain: One coat; stain or tone to color matching existing wood.
b. Wood Varnish: Minimum two coats satin or semi-gloss varnish, as required to match sheen of existing wood.

3.5 INTERIOR PAINT SCHEDULE

A. Concrete:
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior primer as specified for substrate indicated.

B. Gypsum Board:
1. General:
   a. Paint Sheens: As specified in Division 09 Section “Interior Finish Schedule” and indicated on the Drawings.
2. Walls and Ceilings to receive Flat Finish:
   a. General: Acrylic finish, two finish coats over a primer.
   b. Primer: Interior zero VOC/low odor primer as specified for substrate indicated.
   c. Finish Coats: Interior flat zero VOC/low odor acrylic paint.
3. Walls and Ceilings to receive Low-Luster (Eggshell) Finish:
   a. General: Acrylic finish, two finish coats over a primer.
   b. Primer: Primer: Interior zero VOC/low odor primer as specified for substrate indicated.
   c. Finish Coats: Interior low-luster (eggshell) zero VOC/low odor acrylic enamel.
4. Walls and Ceilings to receive Semi-Gloss Finish:
   a. General: Acrylic finish, two finish coats over a primer.
   b. Primer: Primer: Interior zero VOC/low odor primer as specified for substrate indicated.
   c. Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.
5. Walls and Ceilings to receive Epoxy Finish:
   a. General: Epoxy finish, two finish coats over a primer.
   b. Primer: Primer: Interior zero VOC/low odor primer as specified for substrate indicated.
   c. Finish Coats: Interior epoxy finish.

C. Metal Doors and Frames, and Other Miscellaneous Metal:
1. Ferrous Metal:
   a. Acrylic Finish: Two finish coats over a primer.
      1) Primer: Interior primer as specified for substrate indicated (not required on shop-primed items).
      2) Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.
2. Zinc-Coated Metal:
   a. Acrylic Finish: Two finish coats over a primer.
      1) Primer: Interior primer as specified for substrate indicated (not required on shop-primed items).
      2) Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.

D. Wood - Opaque Finish:
1. **Acrylic-Enamel Finish**: Two finish coats over a primer.
   a. **Primer**: Interior primer as specified for substrate indicated.
   b. **Finish Coats**: Interior semigloss zero VOC/low odor acrylic enamel.

E. **Wood - Transparent Finish**:

1. **Miscellaneous Field-Finished Wood**:
   a. **Wood Stain**: One coat.
   b. **Wood Sanding Sealer**: One coat.
   c. **Wood Varnish**: Minimum two coats satin or semi-gloss varnish, as selected by the Architect.

2. **New Wood, Where Indicated to Match Existing Wood**:
   a. **Wood Stain**: One coat; stain or tone to color matching existing wood.
   b. **Wood Sanding Sealer**: One coat.
   c. **Wood Varnish**: Minimum two coats satin or semi-gloss varnish, as required to match sheen of existing wood.

3. **Existing Wood, Including Wood Doors**: After removal of existing varnish or other clear finishes:
   a. **Wood Stain**: One coat; stain or tone to color matching existing wood.
   b. **Wood Sanding Sealer**: One coat.
   c. **Wood Varnish**: Minimum two coats satin or semi-gloss varnish, as required to match sheen of existing wood.

**END OF SECTION 09910**
SECTION 12 34 50
LABORATORY CASEWORK

PART 1 - GENERAL

1.01) SUMMARY

a) Section includes: Provide laboratory casework, shelves, and accessories, complete, as shown and as specified. The work includes the following:
   i) Wood base cabinets and wall cases.
   ii) Polyester laminate/chemsurf open shelves for laboratory benches and work stations; for work station countertops and base cabinets.
   iii) Wood floor cases.
   iv) Cabinet fillers, knee-hole back panels, and scribes.
   v) Aprons and utility chase covers.
   vi) Fasteners for attaching laboratory casework to laboratory frames.
   vii) Aluminum rods for seismic restraint at open ends of shelves and cabinets.
   viii) The work also includes all fabrication, shipping, handling, setup, installation, leveling, scheduling of all laboratory casework.

b) General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

c) Related Sections:

   i) Section 09 65 10 - Resilient Tile Flooring
   ii) Section 09 65 30 – Resilient Base and Accessories

1.02) REFERENCES

a) ANSI - American National Standards Institute
   i) A135.4 - Basic Hardboard.
   ii) A208.1 - Particleboard

b) APA - American Plywood Association

c) ASTM - American Society for Testing and Materials
   ii) A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.


d) AW - Architectural Woodwork
   i) Quality Standards, as modified by the Drawings and Specifications.

e) BHMA - Builders Hardware Manufacturers Association

f) BIFMA - Business and Institutional Furniture Manufacturer's Association

g) CPA - Composite Panel Association

h) HPVA - Hardwood Plywood Veneers Association

i) NEMA - National Electrical Manufacturers Association

j) NPA - National Particleboard Association
   i) 8 - Voluntary Standard for Formaldehyde Emission from Particleboard.

k) PS - United States Department of Commerce, Product Standard
   i) 1 - Construction and Industrial Plywood.
   ii) 51 - Hardwood and Decorative Plywood.

l) SEFA - Scientific Equipment and Furniture Association
   i) 2.3 - Installation of Scientific Laboratory Furniture and Equipment.
   ii) 3 - Work Surfaces.
   iii) 8 - Laboratory Furniture Casework, Shelving, and Tables.

1.03) DEFINITIONS

a) Casework Definitions

1. Exposed Portions
   a. All surfaces visible when doors and drawers are closed, including all cabinet sides (finish to match front).
   b. Underside of bottoms of cabinets over 4' - 0" above finished floor.
   c. Cabinet tops under 6' - 0" above finished floor or if 6' - 0" and over and visible from an upper building level or floor.
   d. Visible front edges of web frames, ends, divisions, tops, shelves, and hanging stiles.
   e. Visible surfaces in open cabinets or behind glass.
   f. Visible portions of bottoms, tops, and ends in front of sliding doors. Top space-finish to match casework.
   g. Toe space - finish to match, horizontal grain allowed.

2. Semi-Exposed Portions
   a. Shelves.
   b. Divisions.
c. Interior face of ends, backs, and bottoms.
d. Drawer sides, subfronts, backs, and bottoms.
e. The underside of wall cabinets between 2'-6" and 4'-0" above the finished floor.

3. Concealed Portions
   a. Sleepers
   b. Web frames, stretchers, and solid sub-tops.
c. Security panels.
d. Underside of bottoms of cabinets less than 2'-0" above the finished floor.
e. Flat tops of cabinets 6'-0" or more above the finished floor, except if visible from an upper building level.
f. The underside of countertops, knee spaces, and drawer aprons.

1.04) SUBMITTALS

a) Product Data: Submit manufacturer’s specifications and installation instructions for review. Include catalog cut of each product to be furnished,

b) Shop Drawings: Submit shop drawings for each item of laboratory casework. Include plans, elevations, sections, and details as required to illustrate shop fabrication, field assembly, and installation. Show size and locations of all cutouts. Identify all manufacturer’s standard components with catalog numbers and identify all materials of custom-fabricated items.

c) Samples: Submit samples of the following:
   i) Color sample of cabinet finish, 8 inch by 10 inch size, of actual finish on substrate.
   2. Color sample of polyester laminate and chemsurf, 8 inch by 10 inch. size.
   3. Sample of door pull.

d) Provide a full size upper cabinet with hinged glass doors, wood frame and hardware and full size wood base cabinet that includes doors, drawers and hardware made in accordance with the Specifications, detail drawings and acceptable shop drawings, with work surface, for each type of casework, incorporating construction details. One week prior to Contractor contacting the Architect for a meeting for review of conformance to Project Drawings and Specifications, Contractor shall deliver to the Architect’s office the sample cabinets as described above, at the Contractor’s expense. Upon completion of review and making requested modifications to the cabinets and acceptance by the Owner, remaining casework construction and installation may commence. Casework fabrication prior to acceptance of samples, shall be solely at the liability of the manufacturer. Contractor shall remove sample units from the Architect’s premises, at the Contractor’s expense, when directed to do so by the Architect. If cabinet(s) are found to be acceptable, Contractor may install the cabinet units into the Project.

e) Submit written certification stating that work is installed per Specifications, applicable codes, and standards; is adjusted, and ready for intended function.
   i) Structural calculations by licensed Structural Engineer, as requested, showing conformance to CBC, Table 16A-0 for seismic anchorage and shelf contents.
f) Submit for the Owner's review and use, 3 complete operations and maintenance manuals that describe proper maintenance and replacement schedules, components parts list, and nearest local factory representative.

1.05) QUALITY ASSURANCE

A. General Requirements
   1. Single Source Responsibility: All laboratory casework and items covered under this Section and Sections 12348 and 12349, shall be the product of 1 manufacturer or supplier to eliminate incompatible items.

B. Product Quality: The Drawings and Specifications outline the design intent and the general requirements of laboratory casework for the Project. Construction details and component specifications for each product are not complete. Each product furnished shall comply with the specified standards and shall be complete for the intended function and operation.

C. Standards: Laboratory casework shall be manufactured in accordance with the standards in the latest edition of the Manual of Woodwork of the Woodwork Institute (WI) and the Architectural Woodwork (AW). Comply with WI sections 14, Wood Casework, and Section 15, Plastic Covered Casework, Laboratory Grade, and AW Section 1600 Modular cabinets, except as specified herein.

1.06) DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas. If, owing to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas which meet the requirements specified for installation areas.

1.07) PROJECT CONDITIONS

A. Environmental Requirements: Do not install woodwork until the required temperature and relative humidity have been stabilized in installation area. Relative humidity shall be between 45% to 65% at 60 degrees to 90 degrees Fahrenheit. Air conditioning and heating system shall be on and functioning 72 hours prior to installation.

1.08) WARRANTY

a) Warrant for a period of 5 years from the Date of Substantial Completion that the Laboratory Casework shall be free of defects in material and workmanship and that it will not fail, deteriorate excessively, or otherwise fail to perform as required.
PART 2 - PRODUCTS

2.01) MANUFACTURERS


2.02) GENERAL

a) Casework and work surfaces shall pass the applicable minimum design load tests in SEFA 3 and 8, AW Section 01600 - Division A Wood Cabinets, as modified by the Drawings and Specifications.

i) Base cabinets shall be constructed to support a uniformly distributed load of 200 pounds per square foot minimum of cabinet top area (total maximum load of 2,000 pounds), including working surface without objectionable distortion or interference with door and drawer operation.

ii) Each adjustable and fixed shelf 4 feet or shorter in length shall support an evenly distributed load of 40 pounds per square foot, up to a maximum of 200 pounds, with nominal temporary deflection, but no permanent set.

b) Type of casework construction shall be:

i) Multiple self-supporting units, concealed support frame.

ii) Flush overlay construction.

iii) Solid banding on doors.

iv) Door and drawer design to be square edged flush.

v) Aprons, filler panels, side panels and sink fronts to be flush with door and drawers.

2.03) MATERIALS

a) Exposed Materials

i) Solid lumber or balanced plywood, 7-ply including face veneers.

1) Face veneer of plain sliced Red Oak.

2) Kiln-dried, selected for compatibility of color and graining in conformance with AW Grade 1. Particle board is acceptable only for door panels if solid reinforcing is used at hardware.

3) Grain pattern shall be book-matched, vertical for doors and sides of cabinets, vertical for drawers.

ii) Do not use exposed faces of lighter-than-average color joined with or adjacent to exposed faces of darker-than-average color. Do not use 2 adjacent faces or filler strips which are noticeably dissimilar in grain, figure, color, or natural character markings. Veneer fitch to be minimum 5 inches to maximum 8 inches wide.

iii) Select solid stock to closely match the color and appearance of adjoining material. Rails are to be solid stock.
iv) Edge-band plywood edges with 1/8-inch thick solid wood of same species as face veneer.

b) Semi-Exposed Materials
i) Solid Lumber: Dry, sound, in accordance with AW Grade 2 rules selected to eliminate appearance defects. Hardwood of similar color and grain (no grain is acceptable) to exposed portions.
ii) Structural rails and box frames are to be solid hardwood.
iii) Plywood: Minimum 5-ply hardwood (3-ply where 1/4-inch), in accordance with AW Grade 2 similar to color and grain (lack of grain acceptable) of exposed members.

c) Concealed Members
i) Solid Lumber or Plywood: Species suitable for intended purpose, with no defects affecting strength or utility in accordance with AW Grade 4.
ii) Particleboard: ANSI A208., Type 1, density grade M, class 3, minimum 45 pound/cubic foot density, formaldehyde free.
iii) Hardboard: ANSI A 135.4, Class I, tempered, 1/8-inch minimum thickness, formaldehyde free.
iv) Welded Fiberboard: Medium density (MDF) wood fibers and resin binders formed under heat and pressure, formaldehyde free.

d) Glass: Clear float glass complying with FS D-D-G-451 Type 1, quality G, without imperfections and with unmarred surfaces. Fully temper glass where indicated. Grind smooth all exposed edges. Proved 1/8-inch thick glass, unless otherwise noted.

e) Plastic Laminate: "Chemsurf" by Wilson Art, neutral light color (white, ivory or light gray).

f) Sealants: As recommended by casework manufacturer.

g) Cabinet Base Molding: Rubber base as specified in Section 09650.

h) Tables: Provide reinforcing cross rail in tables without drawers. Provide leg shoes on table legs, unless otherwise noted. To be extruded vinyl or rubber, black to conceal leveling devise. Movable legged tables shall have non-marking floor glides at least 1-1/2 inches diameter integral with a 5/8-inch leveling device. Metal buttons are not acceptable.

i) Liner: Where noted, liner shall be a single piece insert chemically resistant, inorganic, and non-asbestos with high structural stability, non-combustible, and high impact resistance. If multiple panels, seal between panels. Provide liner full back face of door.

j) Leveling: Shims are acceptable if not visible; distribute load adequately, and are a non-corroding material. Where noted or required a leveling device shall be provided. Bolts shall be cadmium plated steel and accessible for adjustment through cabinet bottom with a closure cap or drawer openings, not through exposed faces of casework.

k) Label Holders: Provide on base cabinets, doors and drawers, formed steel with satin chrome finish 2 inches by 3-1/2 inches screw installed.

2.04) WOOD CASEWORK HARDWARE AND ACCESSORIES

a) Provide manufacturer's standard, satin finish hardware units that conform to AW - Section 1600-S-3, unless otherwise indicated.

b) Hinges: Institutional type, 5-knuckle type 304 stainless steel, brushed stain finish. Provide 1 pair for doors less than 4 feet high and 1-1/2 pairs for doors over 4 feet. Apply such that door passes SEFA 8 door load test. Offset flush for overlay door construction, 180 degree opening.

c) Pulls: D-shaped wire type of 1/4-inch diameter stainless steel with US26D finish. Surface mount for drawers and swing doors, through-bolt from back face. For sliding doors, provide recessed flush pulls, harmonizing with other pulls. Provide 2 pulls for drawers over 24 inches in width. Pulls shall meet State and Federal Accessibility Regulations.

d) Door Catches: Roller spring actuated or self-aligning magnet type, minimum 7 pound pull, with metal strike plates. Provide 2 catches on doors over 5 feet high. Catches permitting rebound opening, not acceptable. Not required on doors with concealed self-closing hinges.

e) Drawer Roller Slides: Provide a quiet smooth operation of corrosion-resistant ball bearing roller slides on drawers, clear zinc coated. Incorporate drawer stop to prevent drawer contact with back of cabinet. The slide shall permit easy removal of drawer without the use of tools and yet prevent inadvertent drawer removal. Hardwood keels and guides are not acceptable.

i) For drawers in cabinets up to 26 inches wide, provide Accuride, "#7434", or equal (no known equal), rail mounted, ball bearing, full extension slide with progressive movement and 100 pound capacity.

ii) For file drawers in cabinets up to 24 inches wide, provide Accuride, "#4034", or equal (no known equal), rail mounted, all ball bearing, slide with over travel, progressive movement and 150 pound capacity.

iii) For drawers in cabinets up to 42 inches wide and cabinet style TR (Rock storage), provide Accuride, "#3640", or equal (no known equal), ball bearing, bracket mounted slide with over travel and 200 pound capacity.

iv) For breadboard style pullout boards, provide Accuride, "#2632", or equal, ball bearing, full extension slide with 75 pound capacity.

v) For standard pencil drawers 16 inches wide or less, provide Accuride, "#2632", or equal, ball bearing, full extension slide with 65 pound capacity.

vi) For pencil drawers 24 inches wide or less that are mounted to the bottom of the work surface, provide Accuride, "#2009 Keyboard Style" or equal, ball bearing, 3/4-extension slide with detent in the open position.
f) Hasps: Chemical resistant coated steel or stainless steel. Surface mount with opening for insertion of Owner supplied lock. Hasp shall not project more than 1 inch and shall have eased edges to percent snagging.

g) Locks: Only where shown or specified, shall be Master Key System.

   i) Provide 5-tumbler, heavy-duty cylinder type with 225 primary key changes in master keyed groups. Exposed nose shall be satin nickel plated and stamped with identifying numbers. Furnish 2 keys with each keyed different lock or lock series. Supply 2 master keys with each system. Key shall be 3/32-inch thick minimum, stamped brass. Keys easily distorted or broken are not acceptable. Keys shall be available from manufacturer or registered locksmith only. Coordinate with Owner’s keying requirements.

h) Seismic Shelf Clips: Provide twin pin, metal clips.

2.05) FABRICATION

a) General

   i) Coordinate casework with laboratory frames and counter tops. Provide all mounting fasteners and accessories.

   ii) Fabricate laboratory casework to dimensions, profiles, and details shown. Fillers shall not exceed 3 inches wide.

   iii) Assemble units in the shop in as large components as practicable to minimize field jointing.

   iv) Install hardware uniformly and precisely after final finishing is complete. Set hinges snug and flat in mortises, unless otherwise indicated. Turn screws to flat seat. Adjust and align hardware so that moving parts operate freely and contact points meet accurately. Allow for final field adjustment after installation.

   v) Drill all holes and provide cutouts in furniture necessary for installation of all service fittings as shown and as required. Obtain all templates from the mechanical and electrical trades necessary to make cutouts.

   vi) Wherever possible, locate rough-ins in the pipe spaces behind furniture units. Cut all holes in back panels of units to accommodate pipes only as large a necessary to permit pipe passage.

b) Casework

   i) Face Construction: Flush overlay type.

   ii) Finish: All sides and back shall be finished with the specified hardwood veneer in transparent finish. All semi-exposed portions shall be finished in the specified polyester laminate.

   iii) Veneer Matching: Run and book match grain vertically for all vertical surfaces.

   iv) Solid Stock Matching: Select solid stocks to match closely the color and appearance of adjoining or adjacent wood material.

   v) Joinery: All cabinet members shall be securely fastened together, by methods listed below. All joints shall be securely glued. Casework shall be assembled square and true, with a tolerance not to exceed 1/32-inch difference in measurement at top versus bottom, and 1/16-inch diagonal measurement. For Laboratory Grades, at the option of the manufacturer, construction joinery shall be as follows:

      1) Dadoes or lock joints, plows or rabbets.
(2) Doweled Joints, a minimum of 2 dowels per joint, 32 mm on center. All dowel construction shall be glued and clamped.

(3) Confirm at type screws. Maximum of 37 mm from each end with subsequent screw being spaced 128 mm on center. Glue is not required with this system.

(4) Lamella type Jointing Plates. The plates shall be a maximum of 2 inches from each edge or end to the center of the plate. Subsequent plates shall be spaced a maximum of 6 inches on center. All joints shall be glued and clamped.

(5) Mod-ez Type Fastening Systems. The fasteners shall be a maximum of 16 inches on center and 4 inches from any edge or end. They shall be fastened with 310 full thread sheet metal screws for cabinet body construction. Glue is not required with this system. No exposed fastening is permitted except for access panels.

vi) Drawers
   (1) Fronts: Minimum 3/4-inch thickness, Anigre veneer with 1/8-inch solid Anigre cap all 4 edges and hardwood plywood core. Securely attach to sides and 1/2-inch minimum hardwood plywood subfronts. Finish: transparent clear. Joints construction: multiple dovetail, doweled, or lock jointed, all joint securely glued.

(2) Bottoms: 1/4-inch minimum hardwood plywood with polyester laminate overlay. Bottoms shall be plowed into sides, back and subfronts.

vii) Cabinet Bodies: Edge-band with a 1/8-inch thick Anigre, except at cabinets with exposed shelving, and where shown at island sink unit, in which case apply solid wood edge trim as used elsewhere.

   (1) Doors shall conform to same thickness and banding requirements as drawer fronts. Interior face shall be same species, color, grain, cut and grade as exposed surface.

   (2) Backs shall be minimum 1/4-inch thick hardboard or plywood with polyester laminate overlay interior. Exposed backs and those on moveable cabinets, shall be 1/2-inch thick. Backs shall be rabbetted or dadoed into sides. Cabinet bottoms shall be minimum 3/4-inch thick.

   (3) Moveable cabinets shall have subtops, minimum 3/4-inch thick. Provide security panels between doors and drawers on cabinets with locks.

   (4) Provide back panel in all knee spaces.

viii) Hardware: Provide 2 drawer pulls on all drawer faces greater then 39-1/2 inches and 1 drawer pull on all drawer faces equal to or less then 39-1/2 inches. Provide 2 drawer spreaders on all drawer bodies 39-1/2 inches or wider. Pull to be selected.

ix) Cabinet Shelves: Minimum 3/4-inch thick hardwood plywood core with polyester laminate overlay on both sides and 1 mm PVC on all 4 edges, full depth.

c) Laminated Plastic Countertops and Splashes

   i) Fabricate in accordance with WI, Laboratory Grade.

   ii) Core Material: Plywood.

   iii) Back Splash

       (1) Height: As indicated.

       (2) Types: As indicated.

       (3) Edge: As indicated.

   iv) Provide 3 inch countertop overhang for clamping equipment at Physics Department countertops.

2.06) OPEN SHELVES FOR LABORATORY CASEWORK
A. Provide shelves with minimum 3/4-inch thick plywood core and chemsurf laminate on top, closed edges and bottom.
   1. Provide minimum 3/4-inch thick Red Oak solid wood on open edges to extend above shelf surface as detailed, finished to match casework, horizontal grain. Veneer tape not acceptable.
   2. Product: As manufactured by Rivet Shelving, or equal.

2.07) WOOD FINISH

a) Transparent Wood Finish: Provide factory finish to comply with chemical and physical resistance requirements. Cloudy, muddy, or uneven finish not acceptable.
   i) Preparation: Sand exposed and semi-exposed components, using machine and hand methods. Machine marks, cross sanding, tool marks or other surface blemishes are not acceptable.
   ii) Exposed Portions: Carefully sand finishes between each surface treatment. Apply finishes in the steps as follows: (Catalyzed vinyl finish may required different procedures).
      (1) Sealer coat, for close-grained wood, if required.
      (2) Stain selected by the Architect.
      (3) Mineral filler, for open grained wood, if required.
      (4) Multiple coats (1.5 dry mil thickness) of highly chemical-resistant finish, force dried and sanded between each coat to produce a smooth, satin luster free of imperfections.
   iii) Semi-Exposed Portions: Finish with stain to match exposed portions followed by 2 coats (1.0 dry mil thickness) of highly chemically-resistant finish.
   iv) Concealed Portions: Seal surfaces against moisture with sealer coat.
   v) Drawer head exteriors to have 3 coats of chemically resistant finish. Apply 2 coats of chemically resistant finish to drawer sides, back and interior surfaces.
   vi) Both sides of cabinet doors and all edges shall receive the same number of coats to prevent warping and twisting.
   vii) Finish shall meet performance characteristics of TR-5, Section 1500, AW.

b) Chemically resistant finish to contain “Blocker” additive to resist finish from sunlight.

c) Manufacturer shall offer a minimum of 6 standard colors for selection by the Architect.

d) Field Touch-Up: Scratches, dents, marks, screw and nail holes, raw or rough edges resulting from installation, shall be properly sanded, puttied, stained, filled and coated to match the original finish. A final dusting of exterior and interior surfaces, including drawers, shall be carefully done including the removal of fingerprints or other marks. A minimum of 1 pint of touch-up stain and finish (properly labeled) shall be provided to the Owner.

PART 3 - EXECUTION

3.01) EXAMINATION

A. Examine the substrate and conditions under which the work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
B. Coordinate and sequence installation of casework with related Section. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.02) INSTALLATION

A. Install all items plumb, level, true, and straight with no distortions. Shim as required using concealed shims. Where casework abuts other finished work, scribe and apply filler strips for accurate fit with all fasteners concealed.

B. Base Cabinets: Set cabinets straight, plumb, and level. Adjust subtops with 1/8-inch of a single plane. Fasten each individual cabinet to laboratory frame with fasteners spaced 24 inches on center. Secure individual cabinets with not less than 4 fasteners into frame where they do not adjoin other cabinets.
   1. Where required, assemble units into 1 integral unit with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16-inch.
   2. Base cabinets shall be installed so that any one cabinet within a row can be removed or installed without disturbing adjoining cabinets.
   3. Provide stainless steel escutcheons for all utilities though casework.
   4. Provide nylon washer at all fastener heads in contact with finish coating.

C. Wall Cabinets: Securely fasten to laboratory frame. Anchor, adjust, and align wall cases as specified for base cabinets.

D. Adjustment: Adjust cabinets and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.03) COUNTERTOPS

a) Run countertop continuous over base cabinets, equipment and spaces as shown.

b) Provide splash at end where top is adjacent to wall or any equipment, fixed or movable, unless otherwise shown.

c) Scribe to wall or other adjacent materials leaving a gap of 1/16-inch minimum. Use sealant of an approved color to seal gaps.

d) Verify finish field dimensions.

e) Apply finish top and splash in full uninterrupted sheets with no splices unless run exceeds maximum limits of material. Use draw-bolt tight joint fasteners at all splice joints. Where run exceeds maximum limits of material use no piece less than 3 feet. Corners and joints: hairline. Locate counter butt joint, if required, at least 2 feet from sink cutouts.

3.04) CLEANING AND PROTECTION

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a) Repair or remove and replace defective work as directed upon completion of installation.

b) Clean shop finished surfaces, touch up as required and remove or refinish damaged or soiled areas as acceptable to the Architect.

c) Protection: Protect materials and installed laboratory casework from damage by work of other trades.

END OF SECTION
SECTION 21 00 00
FIRE SUPPRESSION BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work included in 21 00 00, Fire Suppression Basic Requirements applies to Division 21, Fire Suppression work to provide materials, labor, tools, permits, incidental, and other services to provide and make ready for Owner's use of fire protection systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.

2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.

3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete Item of work furnished.

4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted item.

5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

A. Contents of Section applies to Division 21, Fire Suppression Contract Documents.

B. Related Work:
1. Additional conditions apply to this Division including, but not limited to:
   a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
   b. Drawings
   c. Addenda
   d. Owner/Architect Agreement
   e. Owner/Contractor Agreement
   f. Codes, Standards, Public Ordinances and Permits

1.3 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 21, Fire Suppression Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of California:
   a. CBC California Building Code
   b. CEC California Electrical Code
   c. CEC T24 California Energy Code Title 24
   d. CFC California Fire Code
   e. CMC California Mechanical Code
   f. CPC California Plumbing Code
   g. CSFM California State Fire Marshal
   h. DSA Division of State Architect Regulations and Requirements

C. Reference standards and guidelines include but are not limited to the latest adopted editions from:
1. ANSI  American National Standards Institute
2. ASCE  American Society of Civil Engineers
3. ASME  American Society of Mechanical Engineers
4. ASTM  ASTM International
5. AWWA  American Water Works Association
6. ICC   International Code Council
7. ICC-ESR International Code Council Evaluation Service Reports
8. ISO  International Organization for Standardization
9. NFPA  National Fire Protection Association:
   a. NFPA 13  Standard for Installation of Sprinkler Systems
   b. NFPA 24  Standard for Installation of Private Fire Service Mains and their Appurtenances
10. UL   Underwriters Laboratories Inc.

D. See Division 21, Fire Suppression individual Sections for additional references.

E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

F. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

G. Piping Insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.4 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as specific individual Division 21, Fire Suppression sections.
B. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

C. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail or posted to ftp site. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.

D. Shop Drawings, calculations, product data sheets: Submit as one complete standalone package to AHJ, Owner's insurance underwriter and Engineer.

E. Product Data: Provide Manufacturer's descriptive literature for products specified in Division 21, Fire Suppression Sections.

F. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

1. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed Item. Highlight connections by/to other trades.

2. Include technical data, installation instructions and dimensioned drawings for products, equipment and devices installed, furnished or provided. Reference Division 21, Fire Suppression specification Sections for specific Item required in product data submittal outside of these requirements.

3. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.

4. For vibration isolation of equipment, list make and model selected with operating load and deflection. Indicate frame type where required. Submit manufacturer's product data.
5. See Division 21, Fire Suppression Sections for additional submittal requirements outside of these requirements.

G. Maximum of two reviews provided of complete submittal package. Arrange for additional reviews and/or early review of long-lead Item; Bear costs of additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.

H. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-10 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Part 3 of this Section.

I. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 21, Fire Suppression coordination documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical and Division 28, Electronic Safety and Security submittals.

J. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

K. Substitutions and Variation from Basis of Design:

1. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.

2. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

L. Shop Drawings:
1. Provide coordinated Shop Drawings which include physical characteristics of all systems, equipment and piping layout, pipe layout, hanger layout, sway brace layout, seismic restraints, sway brace calculations, drains, location of drain discharge, risers, valves, details, water test information, physical device layout plans, and control wiring diagrams. Reference individual Division 21, Fire Suppression Sections for additional requirements for shop drawings outside of these requirements.

2. Shop Drawings and hydraulics calculations, sway brace calculations, trapeze hanger calculations, and the like, to be prepared under the direct supervision and control of a Professional Engineer competent to do such work and licensed in the state of California. Drawings and calculations to bear the seal and wet signature of the professional Engineer.

3. Provide Shop Drawings which indicate information required by NFPA 13 and 24. Include room names and fire sprinkler occupancy hazard classifications.

4. Provide Shop Drawings illustrating information for Hydraulic Information Sign for each hydraulic remote area calculated.

5. Utilizing the Reflected Ceiling backgrounds, provide Shop Drawings illustrating locations of fire sprinklers and piping.

6. Utilizing the Structural backgrounds, provide Shop Drawings illustrating locations and types of hangers and sway braces.

7. Provide Shop Drawings illustrating each type of hanger, including fasteners to structure.

8. Provide Shop Drawings illustrating each type of branchline restraint and sway brace, including length of sway brace member, sway brace fittings, minimum and maximum angles from vertical of sway brace member, method of attachment to structure, size, length and embedment of attachment to structure and size and type of structural member to which sway brace will be attached. Number each type of restraint and sway brace. Indicate on Drawings locations of each type of numbered restraint and sway brace.


10. Shop Drawings to include a cross-Sectional view that shows the sprinkler heads and piping in relation to the building's architectural and structural information. View to be chosen based on a location that will display the most information.

11. When required, provide Coordination Drawings.
12. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

M. Samples: Provide samples when requested by individual Sections.

N. Resubmission Requirements:

1. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Clearly indicate changes on Drawings and cloud changes in the submittals.

2. Resubmit for review until review indicates no exceptions taken or make "corrections as noted".

O. Operation and Maintenance Manuals/Owners Instructions:

1. Submit, at one time, one bound copy and electronic files (PDF format) on CD/DVD of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or Item requiring servicing. Include valve charts. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

   a. Include copies of certificates of code authority acceptance, code-required acceptance tests; test reports and certificates,

   b. Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Sections.

   c. Include product certificates of warranties and guarantees.

   d. Include Record Drawings,

   e. Include copy of water supply flow test used as basis for hydraulic calculations.

   f. Include hydraulic calculations and sway brace calculations.

   g. Include Contractor's Material and Test Certificates for Aboveground Piping/Underground Piping.

   h. Include a copy of drain, auxiliary, and low point drains charts.
i. Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.

j. Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, and quantities relevant to each piece of equipment: i.e. belts, motors, lubricants, and filters.

k. Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub-assemblies.

l. Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

2. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 21 00 00, Fire Suppression Basic Requirements, Article titled "Demonstration".

3. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

P. Record Drawings:

1. Maintain at site at least one set of Drawings for recording "As-constructed" conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical Item. Include items changed by field orders, supplemental instructions, and constructed conditions.

2. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.

3. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release.
equal to contract drawings. Submit CAD disk and drawings upon substantial completion.

4. Invert elevations and dimensioned locations for water services and drainage piping below grade extending to 5-feet outside building line.

5. Record Drawings to include site information or reference site information for complete understanding of the fire protection system between the building and the point of connection to the water supply and location of flow test pressure hydrants.

6. See Division 21, Fire Suppression individual Sections for additional items to include in Record Drawings.

Q. Calculations: Submit hydraulic and sway brace and the like calculations.

1. Hydraulic Calculations:
   a. Include friction losses between the hydraulically most remote design area and the hydrant flow test pressure hydrant.
   b. Hydraulic calculations to be performed on a nationally recognized fire sprinkler hydraulic calculation computer program, with cover sheets in the format required by the latest edition of NFPA 13. Hydraulic calculations performed “by hand” or not on a nationally recognized fire sprinkler hydraulic calculations computer program will be returned without review by engineer.
   c. Provide one or more hydraulic calculations for each hydraulically most remote area.
   d. Where it is not obvious which area is most hydraulically remote, perform and submit for review additional hydraulic calculations proving the hydraulically most remote area.
   e. For grid systems, either provide “peaked” hydraulic calculations, or provide two additional sets of hydraulic calculations for each hydraulically most remote area.

2. Sway Brace Calculations:
   a. Sway brace calculations utilizing a proprietary computer calculation program only used for the sway brace components supported by that manufacturer. For example, only “manufacturer X” sway brace components, and not those of another manufacturer, may be calculated on a “manufacturer X” sway brace computer calculation program.
1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State, Federal and other applicable laws and regulations.

B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

E. UL and CSA Compliance: Provide products which are UL and CSA listed.

1.6 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.7 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, and finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.
B. Advise Architect in the event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation.

D. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide like Item from one manufacturer, including but not limited to sprinkler heads, pipe, fittings, and bracing materials.

2.2 MATERIALS

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL, ICC-ES, and CSFM approved for their intended fire protection function or have adequate approval or be acceptable by State, County, and City authorities.

B. Articles, fixtures and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

D. Hazardous Materials:

1. Comply with local, State of California, and Federal regulations relating to hazardous materials.

2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.

3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.
PART 3 - EXECUTION

3.1 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Install equipment requiring access (i.e. drains, control operators, valves, motors, engines, pumps, controllers, air compressors, gauges, fill cups, tanks, cleanouts and the like) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with the following:

   a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with the provisions specified. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.

   b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.

   c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm Firestopping requirements in Division 07. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:
a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM International E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Pipe Installation:

1. Coordinate work to account for expansion and contraction of piping materials and building as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building. Verify construction phasing, type of building construction products and rating coordinating installation of piping systems.

2. Include provisions for servicing and removal of equipment without dismantling piping.

G. Plenums:

1. Provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.2 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Equipment Importance Factor: 1.5.

C. General:

1. Confirm Building Occupancy Category and Seismic Design Category with Structural Engineer.

2. Provide fire suppression equipment and piping, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight or lateral seismic forces as determined by building code and NFPA 13 calculations, whichever is more demanding.
3. See Structural Drawings for seismic design criteria for sway bracing and seismic restraint.

4. Earthquake resistant designs for Fire Protection (Division 21, Fire Suppression) equipment and distribution, i.e. fire sprinkler systems, fire standpipe systems, fire pumps, fire pump controllers, fire tanks, clean agent fire suppression systems, etc. conform to regulations of jurisdiction having authority.

5. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.

6. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping, equipment, tanks, pumps controllers and the like. Submit shop drawings along with equipment submittals.

7. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details. Coordinate exact design requirements with project Structural Engineer.


D. Piping: Per NFPA 13, ASCE-7 and local requirements.

E. Equipment:


2. Provide means to prohibit excessive motion of fire protection equipment during an earthquake.

3.3 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.
B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground piping installation prior to backfilling.

2. Prior to covering walls.

3. Prior to ceiling cover/installation.

4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

5. When mains or branchlines are to be permanently concealed by construction or insulation systems.

6. When fire suppression systems, or portions of, are being tested and ready for inspection by AHJ.

C. Bear responsibility and cost to make piping accessible, to expose concealed lines, or to demonstrate acceptability of the system. If Contractor fails to notify Architect at times prescribed above, costs incurred by removal of such work are the responsibility of the Contractor.

D. Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.4 CONTINUITY OF SERVICE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:

1. During remodeling or addition to existing structures, while existing structure is occupied, current services to remain intact until new construction, facilities or equipment is installed.

2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping, and wiring to point of connection.

3. Coordinate transfer time to new service with Owner. If required, perform transfer during off peak hours. Once changeover is started, pursue to its completion to keep interference at a minimum. If overtime is required, there will be no allowance made by Owner for extra expense for such overtime or shift work.
4. During entire time system, or part thereof, is not operational, provide a firewatch per Fire Code, including a watchperson whose sole duty is to watch for and report fires.

5. Organize work to minimize duration of power interruption.

3.5 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:

1. Cutting and patching performed under Division 21, Fire Suppression includes, but is not limited to:
   a. Cutting and patching of plaster or partitions.
   b. Cutting and patching of finished ceilings.

2. Perform cutting and patching by skilled craftsmen in trade of work to be performed. Fill holes which are cut oversized for completed work. Match refinished areas with existing adjacent finish in a manner acceptable to Architect.

3. When masonry to concrete construction must be penetrated, provide a steel pipe sleeve in opening and grout in place in a neat manner. Leave grout surface to match existing finish. Provide escutcheons. If sleeves are not provided, core drill penetrations.

4. Locate concealed utilities to eliminate possible service interruption or damage.

5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

6. Proposed floor cutting/core drilling/sleeve locations to be approved by project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).

7. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section and will be performed by skilled craftsmen of each respective trade in conformance with appropriate Division of Work.
8. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.

9. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, landscaping, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.

10. Repair mutilation of building around pipes, equipment, hangers, and braces.

3.6 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing at no additional cost to Owner.

3.7 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:

1. Handle materials delivered to project site with care to avoid damage and deterioration. Store materials in original containers which identify manufacturer, name, brand and model numbers on site inside building or protected from weather, sun, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.

2. Protect equipment and pipe to avoid damage. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3. Protect bright finished shafts, bearing housings and similar item until in service.

3.8 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.
B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner’s Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner’s Maintenance Staff as specified in Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

C. Manufacturer’s Field Services: Furnish services of a qualified person at time approved by Owner to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

D. Prior to acceptance of work and during time designated by Architect, provide necessary qualified personnel to operate system for a period of two hours.

E. Instruct the Owner in the operation of the sprinkler system, including main valve position (open or closed) recognition, system drainage, system testing, dry pipe valve reset and the relation to the fire alarm system.

F. Operations and Maintenance Data: At time of system demonstration, deliver to Owner two bound copies (3-ring binder type) of operation and maintenance manuals containing the following materials:

1. Catalog description of each item of equipment actually installed on job.

2. Instructions for operation and maintenance of fire suppression systems composed of operating instructions, maintenance instructions and manufacturer’s literature as follows:

   a. Manufacturer’s Literature: Provide copies of manufacturer’s instructions for operation and maintenance of fire suppression equipment, including replacement parts list with name and address of nearest distributor. Mark each copy with equipment identification label as listed in equipment schedule, i.e. F-5, etc.

   b. Hydraulic calculations.

   c. Seismic sway brace calculations.

   d. Location of each valve.

   e. Location of drains, auxiliary drains, low point drains, method of complete drainage.
G. Upon completion of work and adjustment of equipment, test systems to demonstrate to Owner’s Representative and Architect that equipment is furnished and installed or connected under provisions of these Specifications.

3.9 CLEANING

A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Upon completion of installation, except for sprinklers, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

C. Sprinklers may not be cleaned except for vacuuming in a manner in which no part of the sprinkler is touched by the vacuuming equipment. Replace sprinklers which bear traces of foreign substances with sprinklers of same model, temperature, K-factor, orifice, finish, style, orientation, and the like.

3.10 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Install equipment in accordance with manufacturer’s installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer’s recommended clearances.

C. Start-up equipment, in accordance with manufacturer’s start-up instructions, in the presence of manufacturer’s representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment. Provide pump impellers to obtain Basis of Design design capacities.

D. Provide miscellaneous supports/metals required for installation of equipment and piping.

3.11 PAINTING

A. Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:

1. Ferrous Metal: After completion of fire protection work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces, i.e., hangers,
hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.

2. After acceptance by Authority Having Jurisdiction (AHJ), in a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.

3. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

4. Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

5. Covers: Covers such as vault covers and the like will be furnished with finishes which resist corrosion and rust.

3.12 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and the following:

1. Coordinate locations/sizes of access panels with Architect prior to work. Label access panels with engraved nameplates indicating function of panel.

3.13 DEMOLITION

A. Confirm Demolition requirements in Division 01, General Requirements and Division 02, Existing Conditions. In absence of specific requirements, comply with individual Sections in Division 21, Fire Suppression and the following:

1. Scope:

a. It is the intent of these documents to provide necessary information and adjustments to fire protection system required to meet code, and accommodate installation of new work.

b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.

c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities.
Replace damaged item with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

2. Equipment and Piping: Unless otherwise directed, equipment, piping, or fittings being removed as part of demolition process are Owner's property. Remove other item not scheduled to be reused or relocated from job site as directed by Owner.

3. Unless specifically indicated on Drawings, remove exposed, unused piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap piping and patch surfaces to match surrounding finish.

4. Unless specifically indicated on Drawings, remove unused equipment, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).

5. Coordinate demolition of existing fire suppression systems with Contractor. Where applicable or possible, portions of fire suppression demolition work may be performed by Contractor. Verify with local AHJ as to limitations of demolition by others and not fire suppression trades. Coordinate extent of demolition of fire suppression work to be done by others and supervise this work. No extra costs will be approved by replacement of systems due to improper or excessive demolition.

3.14 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Sections in Division 21, Fire Suppression and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:


   b. Cleaning

   c. Operation and Maintenance Manuals

   d. Training of Operating Personnel
e. Record Drawings
f. Warranty and Guaranty Certificates
g. Start-up/Test Document and Commissioning Reports
h. Letter of Conformance

3.15 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 21 00 00, Fire Suppression Basic Requirements and individual Division 21, Fire Suppression Sections.

B. Upon completion of installation of equipment, sprinklers, hose valves and piping and after units are water pressurized, test system to demonstrate capability and compliance with requirements. When possible, correct malfunctioning item at site, then retest to demonstrate compliance; otherwise remove and replace with new item and proceed with retesting.

C. Inspect each installed item for damage to finish. If feasible, restore and match finish to original, except fire sprinklers, at site; otherwise, remove item and replace with new item. Feasibility and match to be judged by Architect. Remove cracked or dented item and replace with new item.

D. Fire sprinklers may not be reused, or cleaned, except for dusting. Replace damaged, field painted, oversprayed, overcoated or field coated sprinklers with new sprinklers of same manufacturer, model, finish, K-factor and performance characteristics. Where identical replacement sprinklers are not available, provide sprinklers of similar finish, style, K-factor and performance characteristics.

3.16 LETTER OF CONFORMANCE

A. Provide Letter of Conformance and copies of manufacturers’ warranties and extended warranties with a statement that fire suppression items were installed in accordance with manufacturer’s recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers’ warranties and extended warranties in Operation and Maintenance Manuals.
3.17 CONNECTIONS TO EXISTING

A. Prior to connection of piping to existing piping or utilities, field verify existing conditions and exact sizes and locations of existing piping. Provide additional offsets, transitions, joints, cut-ins, and replace portions of existing as required to facilitate connections of new.

END OF SECTION
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SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Buried Ductile Iron Pipe and Fittings
   2. Aboveground Black Steel Pipe and Fittings
   3. Hangers and Supports
   4. Sway Braces and Restraints
   5. Anchors and Attachments

1.2 RELATED SECTIONS

A. Contents of Division 21, Fire Suppression and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:
   1. Division 22, Plumbing
   2. Division 26, Electrical
   3. Division 28, Electronic Safety and Security
   4. Division 31, Earthwork

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.
1.5 QUALITY ASSURANCE
   A. Quality assurance as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY
   A. Warranty of materials and workmanship as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.7 FLOW TEST
   A. Provide materials and labor for a new water supply test on the closest nearby fire hydrants per NFPA 13, and NFPA 291.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Aboveground Black Steel Pipe and Fittings:
      1. Fittings, Mechanical and Grooved Couplings:
         a. Victaulic
         b. Gruvlok
         c. Or approved equivalent.
   B. Hangers and Supports:
      1. Cooper B-Line Tolco
      2. Afcon
      3. Anvil
      4. ITW Buildex Sammys
      5. Or approved equivalent.
   C. Sway Braces and Restraints:
      1. Cooper B-Line Tolco
      2. Afcon
3. Or approved equivalent.

D. Anchors and Attachments:

1. Cast-In Place Anchors:
   a. Cooper B-Line Tolco
   b. Afcon
   c. Or approved equivalent.

2. Attachments:
   a. Hilti
   b. Powers
   c. Or approved equivalent.

2.2 PRODUCT STANDARDS


B. Where pressures are expected to exceed 175 PSI, provide products for high pressure or extra high pressure service.

C. Provide per AHJ requirements.

D. References to product Specifications for materials are listed according to accepted base standards. Materials to meet latest approved versions of these standards.

E. See Section 21 00 00, Fire Suppression Basic Requirements where piping materials are approved for use.

2.3 BURIED DUCTILE IRON PIPE AND FITTINGS

A. Pipe:

1. Class 52 ductile iron, AWWA C151, 150 psi or 10.34 bar. Cement mortar lined, factory encased with 8 mil polyethylene tube or sheet or seal coat per AWWA C104.
B. Fittings:

1. AWWA C110, 250 psi or 17.24 bar. Cement mortar lined. Seal coat: AWWA C104. Double field wrapped with 5 cm, 20 mil vinyl tape, 50 percent overlap, Scotch Wrap No. 51.

2. Fittings restrained with thrust blocks per NFPA 24.

2.4 ABOVEGROUND BLACK STEEL PIPE AND FITTINGS

A. Pipe:

1. 2-inch Diameter and Smaller:
   

b. Minimum of Schedule 40 or Minimum Corrosion Resistance Ratio (CRR) of 1.00 per UL Listing or FM Global Approval. Allied BLT/XL is not permitted.

2. 2-1/2-inch Diameter and Larger:


   b. Schedule 10 or Minimum CRR of 1.00 per UL Listing or FM Global approval. Wall thickness greater than Schedule 5. Schedule 5 not approved.

3. Exposed pipe 8-feet or less above finished floor: A minimum of Schedule 40.

B. Joints:

1. Threaded, flanged or bevel welded.

2. Piping installed in plenums or shafts to have welded joints.

C. Fittings:

1. Threaded:

   a. Malleable Iron: Class 150 and Class 300, ANSI B16.3.

   b. Cast Iron: Class 125 and 250, ANSI B16.3.

2. Flanged:
3. Welded:
   a. Carbon Steel: Long radius, standard weight or extra strong.
   e. Steel Pipe Flanges and Flanged Fittings: ASME B16.5.
   f. Forged Steel Fittings, Socket Welded and Threaded: ASME B16.11.

4. Grooved Couplings:
   a. UL 213, AWWA C606, ASTM A536 ductile iron or ASTM A47 malleable iron, with enamel finish and grooves or shoulders designed to accept grooved couplings. Synthetic-rubber gasket with central-cavity, pressure-responsive design, and ASTM A183 carbon-steel bolts and nuts.
   b. FM Global approved.
   c. Manufacturer: Victaulic or Gruvlok.

D. Anti-Microbial Coating:
   1. Factory-applied coating to inhibit corrosion from microbiological organisms.

2.5 HANGERS AND SUPPORTS

A. General:
   1. Select size of hangers and supports to exactly fit pipe size for bare piping.
   2. Select size of hangers and supports to exactly fit around piping insulation with saddle or shield for insulated piping.

B. Hangers:
1. **Ferrous.** Cooper B-Line Tolco, Afcon, Anvil International, or ITW Buildex Sammys.

2. **ITW Buildex Sammys** with FM Approval only are not allowed in certain seismic zones. Verify with FM that FM Approval is effective in project’s seismic zone.

C. **Hanger Rods:**

1. **Concealed Spaces:** Continuously threaded or threaded ends.

2. **Exposed Spaces:** Threaded ends.

D. **Channel Type Strut and Strut Clamps:**

1. Only models UL Listed or FM Approved for fire protection.

2.6 **SWAY BRACES AND RESTRAINTS**

A. From a single manufacturer and compatible with sway brace calculation program.

B. **Manufacturer:** Cooper B-Line Tolco or Afcon.

2.7 **ANCHORS AND ATTACHMENTS**

A. **General:**

1. Anchor supports to masonry, concrete and block walls per anchoring system manufacturer’s recommendations, or as modified by project Structural Engineer.

B. **Attachments in Concrete:**

1. Suitable for hanging and bracing fire protection systems in concrete which is subject to cracking in a seismic event.


3. See Structural Drawings for additional information regarding acceptable attachments. Attachment products listed in structural Drawings and Specifications take precedence over the following products. If no structural Drawings or Specification provided, then choose from the following: Hilti Kwikbolt TZ, Powers - Snake+, Powers Power-Stud+SD2 or Powers Wedge-Bolt.

4. **Cast-in-Place Anchors:** Cooper B-Line Tolco or Afcon.
PART 3 - EXECUTION

3.1 BURIED DUCTILE IRON PIPE AND FITTINGS

A. Pipe Sleeves:
   1. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.

B. Floor Sleeves:
   1. Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1-inch above finished floor. Caulk pipes passing through floor with nonshrinking firestopping, smokestopping and water stopping grout or approved equivalent caulking compound. Provide "Link-Seal" sleeve sealing system for slab on grade. Caulk/seal piping passing through fire rated building assembly with UL rated assemblies.

C. Wall Sleeves:
   1. Provide "Link-Seal" sleeve sealing system for wall penetrations passing through concrete or masonry construction below grade. Provide sleeves on pipes. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping passing through fire-rated building assemblies with UL Listed or FM approved fire-rated firestopping compound. Provide fire-rated assemblies per local AHJ requirements.
   2. Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Penetrations must be indicated on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Fire Suppression Documents are diagrammatic. Offset piping as required to meet these limitations.

D. General:
   1. Conform to applicable codes and industry standards.
   2. Excavate and backfill per Specification and NFPA 24.

3.2 ABOVEGROUND BLACK STEEL PIPE AND FITTINGS

A. Pressure Piping Routing:
1. Route piping, except as otherwise indicated, vertically and horizontally (sloped to drain). Avoid diagonal runs wherever possible. Orient horizontal routes parallel with walls and beam lines.

2. Install piping as shown or described by diagrams, details and notations on Drawings or, if not indicated, install piping to provide the shortest route which does not obstruct usable space or block access for servicing the building and its equipment.

3. Support piping adjacent to walls, overhead construction, columns and other structural and permanent enclosure elements of the building. Limit clearance to 2-inches wherever furring is indicated for concealment of piping. Allow for insulation thickness. Locate insulated piping to provide minimum 1-inch clearance outside insulation.

4. Wherever possible in finished and occupied spaces, conceal piping from view by locating within column or beam enclosures, hollow wall construction, or above suspended ceilings. Do not encase horizontal routes in solid partitions, except where approved.

B. Couplings:

1. Install where indicated on Drawings and on each side of pieces of equipment to permit easy removal of equipment.

2. Deburr cut edges.

C. Pipe Penetrations:

1. Wire pipe cutout coupon at point of pipe penetration.

3.3 HANGERS AND SUPPORTS

A. Space pipe hangers no more than 4-feet on center for exposed sprinkler pipe located 8-feet or less above finished floor.

B. Limit branch line overhangs to 4-inches or less.

3.4 SWAY BRACES AND RESTRAINTS

A. Locate per orientation and spacing as required by sway brace calculations.

B. Attach sway bracing directly to pipe or equipment being braced.
3.5 ANCHORS AND ATTACHMENTS

A. In post-tension construction, determine location of post-tension cables and install anchors to avoid contact or interference with post-tension cables. Coordinate with Structural.

B. Do not use powder-driven attachments.

3.6 SYSTEM IMPAIRMENT

A. When returning a water-based fire protection system to service after impairment or control valve closure, verify the system is in working order by performing a main drain test per NFPA 25.

3.7 PIPE AND PIPE FITTINGS

A. Expansion and Flexibility: Install work with due regard for expansion and contraction to prevent damage to the piping, equipment, building and its contents. Provide piping offsets, loops, approved type expansion joints, sway bracing, wire restraints, vertical restraints, flexible couplings or other means to control pipe movement and to minimize pipe forces.

B. Install piping in concealed spaces above finished ceilings. Obtain Architect's and Engineer's approval of exposed piping installation.

C. Coordinate support of pipe 4-inches and larger with Structural Engineer.

D. Provide clearances around piping per NFPA 13.

E. Coordinate installation with other trades. Route piping as required to avoid building structure, equipment, plumbing piping, HVAC piping, ductwork, lighting fixtures, electrical conduits and bus ducts and similar work. Final location of lighting will have priority over final sprinkler locations. Provide drains to trapped Sections of system which result from such routing. Other trades take precedence for installation space.

F. General Electrical Equipment Clearances: Do not route piping through electrical rooms, transformer vaults, elevator equipment rooms, and other electrical or electronic equipment spaces and enclosures. Within equipment rooms, provide minimum 3-feet lateral clearance from sides of electric switchgear panels. Do not route piping above electric power or lighting panel, switchgear, or similar electric device. Coordinate with electrical and coordinate exact pipe routing to provide proper clearance with such item.

3.8 BURIED PIPE EXCAVATION AND BACKFILL

A. General:
1. Perform necessary excavation and backfill required for installation of mechanical work.

2. Repair piping or other work damaged by Contractor's operations.

B. Water:

1. Keep excavations free of standing water.

2. Re-excavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.

C. Tests:

1. During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of a testing laboratory.

D. Trench Excavation:

1. Excavate trenches to necessary depth and width, removing rocks, unstable soil (i.e. muck, peat, and the like), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material at no expense to Owner. Adequate width of trench for proper installation of piping or conduit.

E. Support Foundations:

1. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to a depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other Sections of Specifications or Drawings.

2. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.

3. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form a base for replacement of required thickness of bedding material.

4. Bedding Material: Full bed site piping on sand, pea gravel or 3/4-inch minus crushed rock. Place a minimum 4-inch deep layer of sand or crushed rock on
leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide a firm foundation.

F. Backfilling:

1. Following installation and successful completion of required tests, backfill piping in lifts.
   a. In "Pipe Zone," place backfill material and compact in lifts not to exceed 6-inches in depth to a height of 12-inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.
   b. Place and compact backfill above "Pipe Zone" in layers not to exceed 12-inches in depth.

2. Backfill Material:
   a. Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.
   b. Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

G. Compaction of Trench Backfill:

1. Where compaction of trench backfill material is required, use one of following methods or combination thereof:
   a. Mechanical tamper,
   b. Vibratory compacter, or
   c. Other approved methods appropriate to conditions encountered.

2. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.

END OF SECTION
SECTION 21 13 00
FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Pipe, Fittings and Seismic Bracing

B. This is a bidder design system. Contact Authority Having Jurisdiction (AHJ) prior to bid to verify fire system requirements. Provide design compliant with codes as interpreted by AHJ.

C. Scope:
   1. Wet-Pipe Sprinkler System.
   2. Revision and extension of existing system to new and remodeled areas.
   3. Modifications to existing system impacted by structural upgrades.
   4. Seismic bracing of fire sprinkler system components as required by DSA.

D. See "Owners Certificate" for additional information regarding the fire sprinkler system.

1.2 RELATED SECTIONS

A. Contents of Division 21, Fire Suppression and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:
   1. Section 21 00 00, Fire Suppression Basic Requirements
   2. Section 21 05 00, Common Work Results for Fire Suppression

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.
1.4 SUBMITTALS

A. Submittals as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.7 SYSTEM DESCRIPTION

A. Provide coverage for entire building. Field verify field conditions prior to submittal of bid. Adjust bid to provide protection features in accordance with applicable codes and interpretations by AHJ. Provide design and installation based on more stringent requirements if AHJ requirements differ from Code.

B. Sprinkler system design to include a 10 percent pressure and flow cushion between system demand point and available water supplies.

C. Extend hydraulic calculations from hydraulically most remote design area back to location of pressure hydrant of flow test or effective point of water supply where characteristics of water supply are known.

D. Develop cost-effective designs that may include use of extended coverage sprinklers and design area reductions as allowed by NFPA 13.

1.8 EXTRA STOCK

A. Provide extra sprinklers per code; provide suitable wrenches for each sprinkler type, and metal storage cabinet in riser room.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Schedule 10 and 40 black steel pipe with flanges, grooved and threaded fittings.
PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate location of auxiliary drains with Architect. Architect to approve location before drain is installed. Protect valves from tampering or accidental operation.

3.2 PIPE AND FITTINGS

A. Install piping in concealed spaces above finished ceilings. Prior to design and installation obtain preapproval by Architect and Engineer for exposed piping.

B. Install piping as close as possible to ceiling to avoid conflicts with other trades.

C. Install pipe runs to minimize obstruction to other work.

END OF SECTION
SECTION 22 00 00

PLUMBING BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work included in 22 00 00, Plumbing Basic Requirements applies to Division 22, Plumbing work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of plumbing systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.

2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.

3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.

4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.

5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

A. Contents of Section applies to Division 22, Plumbing Contract Documents.

B. Related Work:
1. Additional conditions apply to this Division including, but not limited to:
   
a. Specifications including Division 00, Procurement and Contracting
   Requirements and Division 01, General Requirements.

b. Drawings

c. Addenda

d. Owner/Architect Agreement

e. Owner/Contractor Agreement

f. Codes, Standards, Public Ordinances and Permits

C. Related products/systems located in Division 23, HVAC:

1. Section 23 11 23 - Facility Fuel - Natural Gas Piping and Systems

1.3 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements,
   Division 01, General Requirements, individual Division 22, Plumbing Sections and those
   listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and
   local jurisdiction requirements in effect as of the date of the Contract Documents,
   (of/from):

1. State of California:
   
a. CBC California Building Code

b. CEC California Electrical Code

c. CEC T24 California Energy Code Title 24

d. CFC California Fire Code

e. CMC California Mechanical Code

f. CPC California Plumbing Code

g. CSFM California State Fire Marshal

h. DSA Division of State Architect Regulations and Requirements
C. Reference standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA  Architectural Barriers Act
2. ADA  Americans with Disabilities Act
3. AHRI  Air-Conditioning Heating & Refrigeration Institute
4. ANSI  American National Standards Institute
5. ASCE  American Society of Civil Engineers
6. ASHRAE  American Society of Heating, Refrigerating and Air-Conditioning Engineers
7. ASHRAE  Guideline 0, the Commissioning Process
8. ASME  American Society of Mechanical Engineers
9. ASPE  American Society of Plumbing Engineers
10. ASSE  American Society of Sanitary Engineering
11. ASTM  ASTM International
12. AWWA  American Water Works Association
13. CFR  Code of Federal Regulations
14. CGA  Canadian Gas Association
15. CISPI  Cast Iron Soil Pipe Institute
16. CSA  CSA International
17. ETL  Electrical Testing Laboratories
18. EPA  Environmental Protection Agency
19. FDA  Food & Drug Administration
20. FM  FM Global
21. IAPMO  International Association of Plumbing and Mechanical Officials
22. GAMA  Gas Appliance Manufacturers Association
23. HI    Hydraulic Institute Standards
24. ISO   International Organization for Standardization
25. MSS   Manufacturers Standardization Society
26. NEC   National Electric Code
27. NEMA  National Electrical Manufacturers Association
28. NFGC  National Fuel Gas Code
29. NFPA  National Fire Protection Association
30. NRCA  National Roofing Contractors Association
31. NSF   National Sanitation Foundation
32. OSHA  Occupational Safety and Health Administration
33. SMACNA Sheet Metal and Air Conditioning Contractors’ National Association, Inc.
34. TEMA  Tubular Exchanger Manufacturers Association
35. TIMA  Thermal Insulation Manufacturers Association
36. UL    Underwriters Laboratories Inc.
37. USDA  United States Department of Agriculture

D. See Division 22, Plumbing individual Sections for additional references.

E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

F. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.
G. Piping insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.4 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as specific individual Division 22, Plumbing Sections.

B. In addition:

1. "No Exceptions Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

2. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail or posted to ftp site. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.

3. Product Data: Provide Manufacturer's descriptive literature for products specified in Division 22, Plumbing Sections.

4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

   a. Label submittal to match numbering/references as shown in Contract Documents and schedules. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.

   b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed,
furnished or provided. Reference Division 22, Plumbing Sections for specific items required in product data submittal outside of these requirements.

c. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.

d. For vibration isolation of equipment, list make and model selected with operating load and deflection. Indicate frame type where required. Submit manufacturer’s product data.

e. See Division 22, Plumbing Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of additional reviews at Engineer’s hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.

6. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer’s installation and support requirements to meet ASCE 7-10 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Part 3 of this Section.

7. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 22, Plumbing Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.

8. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

9. Substitutions and Variation from Basis of Design:

   a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.

   b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and
compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

10. Shop Drawings: Provide coordinated Shop Drawings which include physical characteristics of all systems, equipment and piping layout plans, and control wiring diagrams. Reference individual Division 22, Plumbing Sections for additional requirements for Shop Drawings outside of these requirements.
   a. Provide Shop Drawings indicating sanitary and storm cleanout locations and type to Architect for approval prior to installation.
   b. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

11. Samples: Provide samples when requested by individual Sections.

12. Resubmission Requirements:
   a. Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
      1) Resubmit for review until review indicates no exceptions taken or "make corrections as noted".
      2) When submitting drawings for Engineers re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

13. Operation and Maintenance Manuals, Owners Instructions:
   a. Submit, at one time, one bound copy and electronic files (PDF format) on CD/DVD of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Include valve charts. Submit data when work is substantially complete.
and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.

2) Include copy of manufacturer’s standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer’s recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: belts, motors, lubricants, and filters.

3) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub-assemblies.

4) Include copy of startup and test reports specific to each piece of equipment.

5) Include copy of final water systems balancing log along with pump operating data.

6) Include commissioning reports.

7) Include copy of pressure, flow, leakage and purity test data and water systems test data, as applicable. Include copy of third-party and state and local jurisdiction inspection reports.

8) Include copy of valve charts/schedules.

9) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

10) Include product certificates of warranties and guarantees.

11) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.
b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 22 00 00, Plumbing Basic Requirements article titled "Demonstration".

c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

14. Record Drawings:

   a. Maintain at site at least one set of drawings for recording "As-constructed" conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical items. Include items changed by field orders, supplemental instructions, and constructed conditions.

   b. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.

   c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD disk and drawings upon substantial completion.

   d. Provide invert elevations and dimensioned locations for water services, building waste, and storm drainage piping below grade extending to 5-feet outside building line.

   e. See Division 22, Plumbing individual Sections for additional items to include in record drawings.

1.5 QUALITY ASSURANCE

   A. Regulatory Requirements: Work and materials installed to conform with all local, State, Federal and other applicable laws and regulations.

   B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturers equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems
and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

E. UL and CSA Compliance: Provide products which are UL and CSA listed.

F. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

G. Provide safety controls required by National Boiler Code (ASME CSD 1) for boilers and water heaters with an input of 400,000 BTUH and higher.

1.6 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Contracting and Procurement Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty in Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.7 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension, and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.
B. Advise Architect in the event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.

D. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide like items from one manufacturer, including but not limited to fixtures, pumps, drains and equipment.

2.2 MATERIALS

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL or CSA approved or have adequate approval or be acceptable by State, County, and City authorities.

B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

D. Hazardous Materials:

1. Comply with local, State of California, and Federal regulations relating to hazardous materials.

2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.

3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.
2.3 ACCESS PANELS

A. See Division 01, General Requirements and Division 08, Openings for products and installation requirements.

B. Confirm Access Panel requirements in Division 01, General Requirements, Division 08, Openings and individual Division 22, Plumbing Sections. In the absence of specific requirements, comply with the following:

1. Provide flush mounting access panels for service of systems and individual components requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly.

   a. Ceiling access panels to be minimum 24-inch by 24-inch required and approved size.

   b. Wall access panels to be minimum of 12-inch by 12-inch required and approved size.

   c. Provide screwdriver operated catch.

   d. Manufacturers and Models:

      1) Drywall: Karp KDW.

      2) Plaster: Karp DSC-214PL.

      3) Masonry: Karp DSC-214M.

      4) 2 hour rated: Karp KPF-350FR.

      5) Milcor, Elmdor, Acudor, or approved equivalent.

PART 3 - EXECUTION

3.1 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Install equipment requiring access (i.e., drain pans, drains, control operators, valves, motors, cleanouts and water heaters) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.
C. Install equipment and products complete as directed by manufacturer’s installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

   a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with the provisions of related earthwork Sections/divisions. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.

   b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.

   c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

   a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer’s installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Pipe Installation:

1. Coordinate work to account for expansion and contraction of piping materials and building as well as anticipated settlement or shrinkage of building. Install
work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building. Verify construction phasing, type of building construction products and rating for coordinating installation of piping systems.

2. Include provisions for servicing and removal of equipment without dismantling piping.

G. Plenums:

1. Provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.2 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22 Plumbing Sections.

B. Equipment Importance Factor: 1.0.

C. General:

1. Confirm Building Occupancy Category and Seismic Design Category with Structural Engineer.

2. Earthquake resistant designs for Plumbing (Division 22, Plumbing) equipment and distribution, i.e. motors, plumbing systems, piping, equipment, water heaters, boilers, etc. conform to regulations of jurisdiction having authority.

3. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.

4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping equipment and water heaters. Submit Shop Drawings along with equipment submittals.

5. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details. Coordinate exact design requirements with project Structural Engineer.
D. Piping:


E. Equipment:

1. Provide means to prohibit excessive motion of plumbing equipment during earthquake.

3.3 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground piping installation prior to backfilling.
2. Prior to covering walls.
3. Prior to ceiling cover/installation.
4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Bear responsibility and cost to make piping accessible, to expose concealed lines, or to demonstrate acceptability of the system. If Contractor fails to notify Architect at times prescribed above, costs incurred by removal of such work are the responsibility of the Contractor.

D. Final Punch:

1. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.4 CONTINUITY OF SERVICE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:
1. During remodeling or addition to existing structures, while existing structure is occupied, current services to remain intact until new construction, facilities or equipment is installed.

2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping, and wiring to point of connection.

3. Coordinate transfer time to new service with Owner. If required, perform transfer during off peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum.
   
a. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.

4. Organize work to minimize duration of power interruption.

3.5 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).

2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section and will be performed by skilled craftsmen of each respective trade in conformance with appropriate Division of Work.

3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.

4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing piping and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.6 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

3.7 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.

2. Protect equipment and pipe to avoid damage. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3. Protect bright finished shafts, bearing housings and similar items until in service.

3.8 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to
3.9 CLEANING

A. Confirm cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.10 INSTALLATION

A. Confirm installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Install equipment and fixtures in accordance with manufacturer’s installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer’s recommended clearances.

C. Start up equipment, in accordance with manufacturer’s start-up instructions, and in presence of manufacturer’s representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

   1. Do not place equipment in sustained operation prior to initial balancing of plumbing systems.

   2. Provide pump impellers to obtain Basis of Design design capacities.

D. Provide miscellaneous supports/metals required for installation of equipment, piping and ductwork.

3.11 PAINTING

A. Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

   1. Ferrous Metal: After completion of plumbing work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt for exterior or black enamel for interior, suitable for hot surfaces.
2. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.

3. See individual equipment Specifications for other painting.

4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

5. Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

6. Covers: Covers such as manholes, cleanouts and the like will be furnished with finishes which resist corrosion and rust.

3.12 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In absence of specific requirements in Division 01, General Requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Coordinate locations/sizes of access panels with Architect prior to work. Label access panels with engraved nameplates indicating function of panel.

3.13 DEMOLITION

A. Confirm Demolition requirements in Division 01, General Requirements and Division 0. In absence of specific requirements, comply with individual Sections in Division 22, Plumbing and the following:

1. Scope:
   a. It is the intent of these documents to provide necessary information and adjustments to plumbing system required to meet code, and accommodate installation of new work.
   b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
   c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.
2. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.

3. Unless specifically indicated on Drawings, remove exposed, unused piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap piping and patch surfaces to match surrounding finish.

4. Unless specifically indicated on Drawings, remove unused equipment, fixtures, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).

3.14 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Sections in Division 22, Plumbing and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:

   a. Testing and Balancing Reports
   b. Cleaning
   c. Operation and Maintenance Manuals
   d. Training of Operating Personnel
   e. Record Drawings
   f. Warranty and Guaranty Certificates
   g. Start-up/Test Document and Commissioning Reports

3.15 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Tests:
1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.

2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.16 LETTER OF CONFORMANCE

A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that plumbing items were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

3.17 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize plumbing equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

END OF SECTION
SECTION 22 10 00
PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY
A. Work included: Provision of materials, installation and testing of:
   1. Sanitary, Drainage (Rain/Stormwater) DWV Piping, Buried Within 5-feet of Building

1.2 RELATED SECTIONS
A. Contents of Division 22, Plumbing and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS
A. References and Standards as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.
B. In addition, meet the following:
   1. NSF 61 Appendix 'G' - Low Lead Products Used in Drinking Water Systems (less than or equal to .25 percent lead).

1.4 SUBMITTALS
A. Submittals as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE
A. Quality assurance as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY
A. Warranty of materials and workmanship as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Uponor
B. Cerro
C. Dodge Phelps
D. Tyler
E. Charlotte
F. Elkhart
G. Enfield
H. Spears
I. Nibco
J. Aquatherm
K. Victaulic
L. Orion
M. or approved equivalent.

2.2 GENERAL

A. Provide pipe, tube and fittings of the same type, fitting requirements, grade, class and the size and weight indicated or required for each service, as indicated in other Division 22, Plumbing Specifications. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

B. Manufactured materials delivered, new to the project site and stored in their original containers.

C. Product Marking: Each item to be furnished with legible markings indicating: name brand and manufacturer, manufacturing process, heat number and markings as required per ASTM and UL/FM Standards.

D. Applicable Standards
1. Steel pipe to conform to ASTM and ANSI Standards as specified in this Section.

2. Copper piping to conform to ASTM B88, B306 and B208 and the standards of Copper Development Association (CDA), and American Welding Society, (AWS).


4. Manufacturer's Standards Society (MSS) for valving and support reference standard.

5. American Waters Association (AWWA) for Valving Assembly Standards.

6. American Society of Sanitation Engineers (ASSE) for Valving Standards.

7. American National Standards Institute (ANSI) for Piping Standards.

8. NFPA Standard 51B - “Fire Prevention in Use of Cutting and Welding Processes”.

9. Crosslinked polyethylene (PEX) pipe conforming to ASTM F876, F877 and CSA B1375, or DIN 16892 and 16893.

2.3 SANITARY, DRAINAGE (RAIN/STORM WATER) DWV PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Cast Iron Pipe: ASTM A 74 extra heavy or service weight hub and spigot.

1. Fittings: Cast iron.


1. Fittings: Cast iron.

2. Coupling Assembly:
   
a. Heavy Duty: ASTM C1540/SED4000, Clamp-All Hi-Torq 125 coupling. Husky SD 4000.


C. Copper Tube: ASTM B 306, DWV


D. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), L (B), or M (C).

E. ABS Pipe: ASTM D2751 schedule 40 single extrusion or ASTM F628 Schedule 40, co extruded.
   1. Fittings: ABS DWV ASTM D2661.


G. Epoxy Coating:
   1. No-hub two-part epoxy coated cast iron soil pipe and fittings to be certified to conform to ASTM A-888-11. Epoxy coating: Minimum of 2.5 mil thickness on exterior and a minimum of 5.0 mil thickness on interior. Spray-on two part epoxy coating to provide a superior coating. Test epoxy coated cast iron soil pipe and fittings to be nonreactive from 2-12 pH for thirty days. Epoxy coating shall not sag, cold flow or become soft.
   2. Coupling Assembly:
      a. Standard Duty: Couplings to be 310 series stainless steel with 5/16-inch hex head screws of 305 stainless steel. ASTM 1277 or CISPI 310 Anaco, Mission, NewAge Casting (NAC), Tyler.
      b. Heavy Duty: Couplings to be 301 series stainless steel with 5/16-inch hex head screws of 305 stainless steel. ASTM C 1540310 Anaco, Mission, NewAge Casting (NAC), Tyler.
      c. Coupling to have a polychloroprene (neoprene) based interior rubber sleeve conforming to ASTM C564.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 INSTALLATION

A. Work performed by experienced journeyman plumbers. No exceptions.

B. Provide access panels for concealed valves, shock arrestors and trap primers.

C. Install pipes and pipe fittings in accordance with recognized industry practices.


E. Locate piping runs, as indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details, and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, and other structural and permanent-enclosure elements of building. Limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1-inch clearance outside insulation. Whenever possible in finished and occupied spaces, conceal piping from view by locating it in column enclosures, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as indicated.

1. Do not run piping through transformer vaults, telephone, elevator, electrical or electronic equipment spaces or enclosures.

2. Concealed Piping Above Suspended Ceiling: Plan and coordinate to avoid interferences; install to maintain suspended ceiling heights shown on Architectural Drawings. Allow sufficient space above removable ceiling panels for panel removal. Locate piping so that valves are visible and accessible within 24-inches horizontally and vertically from point of access to the ceiling space.

3. Exposed Work: Run pipes parallel to the closest wall unless otherwise shown on Drawings; maintain maximum headroom; avoid light fixtures.

4. Insulation Space Allowance: In piping work, allow space for pipe insulation and jackets. If interferences occur, move the piping to accommodate insulation thickness specified.
5. Pipe Lengths: Do not use short lengths or nipples at locations where a full length of pipe will fit.

6. Alignment Prior to Supporting and Anchoring: Place piping in proper alignment and position prior to connection to anchors, expansion loops, and equipment. Furnish jacking devices, temporary steel structural members, and assembled structures as necessary. Remove temporary equipment and structures supplied by contractor at completion; such items to remain Contractor property.

7. Valve and Equipment Connections: Piping not to place undue stress on flanged valves and equipment connections. Mating flange faces to be true and parallel to each other and not to require springing of piping for assembly. Pipe hangers and supports to carry the full weight of the pipe and fluid.

8. Piping Leaks: Correct immediately; use new materials; leak-sealing compounds or peening not permitted.

9. Pressure Ratings of Fittings, Valves, and Devices in Piping Systems: Pressure rating to be equal to or greater than the maximum working pressure of the system.

10. Equipment Vents and Drains: Provide for coils and vessels which contain water. Provide isolation valves and outlet valves at piping high and low points to permit venting and draining of the vessel without venting and draining connected piping. Provide hose connections and caps on drain lines.

11. Escutcheon Plates: Where exposed insulated and uninsulated piping passes through walls, floors or ceilings; provide spring clip type. Provide plates on both sides of wall or floor.

3.3 PIPE JOINTS

A. Piping to be cut squarely, free of rough edges and reamed to full bore. Piping to be fully inserted into fittings.

B. Provide joints of type indicated in each piping system.

C. Thread pipe in accordance with ANSI B2.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Remove excess cutting oil from piping prior to assembly. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.

D. Solder copper tube and fitting joints with lead free nickel/silver bearing solder meeting ASTM std. B-32, in accordance with IAPMO I 3-93, ASTM B-828 and Copper Development Association recommended procedures. Joints to be cleaned by other
than chemical means prior to assembly. "Shock" cooling is prohibited. Fluxes to be water soluble for copper and brass potable water applications, and meets CDA standard test method 1.0 and ASTM B813-91. Solder to be applied until a full fillet is present around the joint. Solder and flux not to be applied in such excessive quantities as to run down interior of pipe. Lead solder or corrosion flux not to be present at the jobsite.

E. Braze copper tube and fitting socket with BCUP series filler metal without flux. Listed brazing flux to be used for joining of copper tube to brass or bronze fittings and will meet AWS FB3A or FB3C. "Shock" cooling is prohibited. a continuous fillet is to be visible around the completed joint. After cooling, flux residue to be thoroughly removed with warm water and a brush prior to testing. Do not use BCUP filler on copper alloys containing over 10 percent nickel. Piping is to be capped or plugged during construction to prevent entry of foreign material.

F. Cast-Iron Joints: Comply with coupling manufacturer's Cast Iron Soil Pipe Institute Standards and installation instructions.

G. Welders performing work under this Contract to be certified and qualified in accordance with tests prescribed by the National Certified Welding Bureau (NCWB) or by other approved test procedures using methodology and procedures covered in the ASME Boiler and Pressure Vessel Code, Section IX, "Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators". Installation to conform to ANSI 31.1 "Power Piping".

1. Submit for approval the names, identification, and welder's assigned number, letter or symbol for welders assigned to this project.

2. The assigned identification symbol to be used to identify the work of each welder and to be indelibly stamped immediately upon completion of each weld.

3. Welders to be tested and certified for all positions.

4. Submit identifying stenciled test coupons made by each operator.

5. Welders may be required to retake welding certification tests without additional expense.

6. When so requested, a welder will not be permitted to work as a welder on this project until he has been recertified in accordance with NCWB.

7. Recertification of the welder to be made after the welder has taken and passed the required tests.

H. Weld pipe joints in accordance with recognized industry practice and as follows:

1. Weld pipe joints only when ambient temperature is above 0F.
2. Bevel pipe ends at a 37.5 degree angle where possible, smooth rough cuts, and clean to remove slag, metal particles, and dirt.

3. Use pipe clamps or tack-weld joints with 1-inch long welds, 4 welds for pipe sizes to 10-inches, 8 welds for pipe sizes 12-inches to 20-inches.

4. Build up welds with a stringer-bead pass, followed by a hot pass, followed by a cover or filler pass. Eliminate valleys at center and at edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes, and non-metallic inclusions.

5. Do not weld out piping system imperfections by tack-welding procedures. Re-fabricate to comply with requirements.

6. At Installer's option, install forged branch-connection fittings whenever branch pipe is indicated, or install a regular T-fitting.

I. Flanges:

1. Provide flanges at steel or copper piping, valves and equipment, sizes 2-1/2-inches or larger, unless specified otherwise; weld neck or slip-on pattern.

2. Bolts: Provide studs (both ends threaded) with hexagon nuts where necessary to facilitate removal of valves or disassembly of flanged systems.

3. Dielectric Flanged Insulation: Provide on dissimilar metal flanged piping connections.

3.4 SANITARY AND STORM SEWER

A. Piping to be graded at a uniform pitch of 2 percent unless otherwise noted on Drawings.

B. Indirect Waste or Drain Piping: Extend piping to discharge as shown on Drawings. Maintain minimum air gap. Provide traps on direct waste or drain piping exceeding 60-inches.

C. Fixture Carriers: Concealed fixture carriers for wall hung plumbing fixtures are specified in Section 22 40 00.

D. Drains:

1. Install drains to suit finished floor or roof surface. Install drains and components per manufacturer's instructions. Arrange for flooring to be sloped to floor drain or sink a minimum of 1/2-inch below finished floor elevation.
2. Install P-traps for hub drains, floor drains and floor sinks P-traps to be of the same materials as soil and waste piping. Provide trap primer assembly for each drain or floor sink.

E. Wall Access Panel: Secure to wall framing and install so that flange forms a close fitting joint with the finished wall surface.

F. Heat trace and insulate P-traps exposed to freezing conditions.

G. Insulate horizontal branch lines from floor sinks, receptors and drains receiving cold discharge from equipment and appliances.

3.5 DOMESTIC WATER

A. "Piping" to include pipes, fittings, nipples, valves and accessories connected thereto.

B. Run piping generally parallel to the axis of the building, arranged to conform to the building requirements and to suit the necessities of clearance for other mechanical ducts, flues, conduits and work of other trades, and as close to ceiling or other construction as practical, free of unnecessary traps or bends.

C. Grade water supply piping for complete drainage of the system. Install hose bibbs at low points.

D. Piping connections to equipment to be made up with unions.

E. Provide sufficient elbows, swings and offsets to permit free expansion and contraction.

F. Use reducers or increasers. Use no bushings.

G. Ream or file each pipe to remove burrs. Inspect each length of pipe and each fitting for workmanship and clear passageways.

H. Cover, cap or otherwise protect open ends of piping during construction to prevent damage to threads or flanges and prevent entry of foreign matter. Disinfect and sterilize water supply piping as specified. Furnish written report on final water quality results.

I. Exposed connections to equipment to be installed with special care, showing no tool marks or threads at fittings and piping. No bowed or bent piping to be permitted.

J. Ferrous to non-ferrous connections to be made by means of dielectric fittings.

K. Use extra heavy pipe for nipples, where unthreaded portion is less than 1-1/2-inches. Use no close nipples. Use only shoulder-type nipples.
L. Through-Wall Pipes: Type 'L' copper tubing for through-wall pipes which connect to exposed stops at wall surface. Anchor the pipes in the wall; attach pipe with U-bolts to steel back-up plates or steel angles anchored in the wall. Provide wrought copper elbow which securely anchors ears in wall at through-wall pipes.

M. Provide drain valves at base of risers and at low points on the system.

N. Backflow Preventers: Pipe relief to nearest drain. Slope at 2 percent.

3.6 EXCAVATION AND BACKFILL

A. Trenching, bedding and backfill to meet the requirements of the Project Geotechnical Report. The standards listed below are a minimum.

B. Native soils may not be used for bedding or pipe zone backfill without specific approval of the Project Geotechnical Consultant.

C. General: Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work at no expense to Owner.

D. Water: Keep excavations free of standing water. Reexcavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.

E. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of testing laboratory.

F. Trench Excavation: Excavate trenches to necessary depth and width, removing rocks, unstable soil (muck, peat), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material. Adequate width of trench for proper installation of piping or conduit.

G. Support Foundations:

1. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other Sections of Specifications or Drawings.

2. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.
3. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form base for replacement of required thickness of bedding material.

<table>
<thead>
<tr>
<th>Material Passing</th>
<th>Class A</th>
<th></th>
<th>Class B</th>
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<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
<td>Min.</td>
</tr>
<tr>
<td>3/4-inch Square Opening</td>
<td>27</td>
<td>47</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Bedding Material: Full bed piping on sand, pea gravel, or 3/4-inch minus crushed rock. Place minimum 4-inch deep layer of sand, pea gravel, or crushed rock on leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide firm foundation.

H. Backfilling:

1. Following installation and successful completion of required tests, backfill piping in lifts.

   a. In "Pipe Zone" place backfill material and compact in lifts not to exceed 6-inches in depth to height of 12-inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.

   b. Place and compact backfill above "Pipe Zone" in layers not to exceed 12-inches in depth.

2. Backfill Material:

   a. Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.

   b. Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

I. Compaction of Trench Backfill:

1. Where compaction of trench backfill material is required, use one of following methods or combination thereof:

   a. Mechanical tamper,
b. Vibratory compactor, or

c. Other approved methods appropriate to conditions encountered.

2. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.

3.7 TESTING

A. General:

1. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test Sections of each piping system independently, but do not use piping valves to isolate Sections where test pressures exceed local valve operating pressure rating. Fill each Section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.

2. Notify Architect and local Plumbing Inspector 2 days before tests.

3. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to water pressure of minimum of 5 PSI head. System to hold water without water level drop greater than 1/2 pipe diameter of largest nominal pipe size within 24-hour period. Test system in Sections if minimum head cannot be maintained in each Section. 5 PSI head to be minimum pressure at highest joint.

4. Water Piping: Eliminate air from system. Fill and test at 125 PSIG or minimum 1-1/2 times static pressure at connection to serving utility main for period of two hours with no loss in pressure.

5. Send test results to Architect for review and approval.

B. Testing of Pressurized Systems:

1. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.

2. Observe each test Section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.
C. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at hydrostatic pressure of 125 PSIG.

3.8 STERILIZATION OF DOMESTIC WATER SYSTEM

A. General: Upon completion of tests and necessary replacements, thoroughly flush and disinfect domestic water piping.

B. Method: After thoroughly flushing system with water to remove sediment, fill system with a solution containing 50 parts per million of chlorine for not less than 24 hours or 200 parts per million of chlorine for not less than 3 hours. After retention, drain, refill and return system to service.

C. Certification: Provide copy of domestic water chlorination certificate in each operations and maintenance manual.

D. Provide water line disinfections performed by a licensed contractor with training in potable water line disinfections.

E. Provide water line disinfections performed by a D1 Water Operator licensed in the State of California.

3.9 CORROSIVE SOIL CONDITIONS

A. Wrap steel, iron, copper or other metal piping materials/fittings with Protecto Wrap 200, 30 mils or greater. Maintain a 1/2-inch overlap and install per manufacturer's requirements.

3.10 PROTECTION

A. Keep pipe openings closed by means of plugs or caps to prevent entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of work.

3.11 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A. Provide proper sizing when providing sleeves or core-drilled holes to accommodate penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet requirements of ASTM E814.

B. Manufacturers: Hilti and Proset.
3.12 BURIED PREINSULATED PIPE INSTALLATION

A. Installation and Testing: Install and test products in accordance with manufacturer's installation instructions.

B. Manufacturer's installation instructions shall describe the following:

1. Storage and handling of pipes.
2. Trench preparation.
3. Installing pipe.
4. Installing accessories.
5. Installing fittings.
7. Field insulation kits.
8. Testing.

3.13 EPOXY COATED CAST IRON PIPE AND FITTINGS

A. Coating of cut piping: The piping terminus of any cut piping shall be coated with an applied epoxy per manufactures instructions. Macroopxy 686 by Sherwin Williams, Scotch Cote 323.

END OF SECTION
SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING (HVAC) BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work included in 23 00 00, HVAC Basic Requirements applies to Division 23, HVAC work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of heating, ventilating and air conditioning systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.

2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.

3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work provided.

4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.

5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

A. Contents of Section applies to Division 23, HVAC Contract Documents.
B. Related Work:

1. Additional conditions apply to this Division including, but not limited to:
   a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
   b. Drawings
   c. Addenda
   d. Owner/Architect Agreement
   e. Owner/Contractor Agreement
   f. Codes, Standards, Public Ordinances and Permits

1.3 REFERENCES AND STANDARDS

A. References and Standards per Division 01, General Requirements, individual Division 23, HVAC Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of California:
   a. CBC California Building Code
   b. CEC California Electrical Code
   c. CEC T24 California Energy Code Title 24
   d. CFC California Fire Code
   e. CMC California Mechanical Code
   f. CPC California Plumbing Code
   g. CSFM California State Fire Marshal
   h. DSA Division of State Architect Regulations and Requirements
i. All Equipment to comply with the requirements of the current edition of the California Energy Commission Regulations and Standards.

C. General: Reference standards and guidelines include but are not limited to the latest adopted editions from:

1. ABMA  American Bearing Manufacturers Association
2. ADA    Americans with Disabilities Act
3. AHRI   Air-Conditioning Heating & Refrigeration Institute
4. AMCA   Air Movement and Control Association
5. ANSI   American National Standards Institute
6. ASCE   American Society of Civil Engineers
7. ASHRAE American Society of Heating, Refrigeration and Air-Conditioning Engineers
8. ASHRAE Guideline 0, The Commissioning Process
9. ASME   American Society of Mechanical Engineers
10. ASPE   American Society of Plumbing Engineers
11. ASSE   American Society of Sanitary Engineering
12. ASTM   ASTM International
13. AWWA   American Water Works Association
15. CGA    Canadian Gas Association
16. CHPS   Collaborative for High Performance Schools
17. CISPI  Cast Iron Soil Pipe Institute
18. CSA    CSA International
19. EPA    Environmental Protection Agency
20. ETL  Electrical Testing Laboratories
21. FDA  Food and Drug Administration
22. FM  FM Global
23. GAMA  Gas Appliance Manufacturers Association
24. HI  Hydraulic Institute Standards
25. IAPMO  International Association of Plumbing & Mechanical Officials
26. IFGC  International Fuel Gas Code
27. ISO  International Organization for Standardization
28. MSS  Manufacturers Standardization Society
29. NEC  National Electric Code
30. NEMA  National Electrical Manufacturers Association
31. NFPA  National Fire Protection Association
32. NFGC  National Fuel Gas Code
33. NRCA  National Roofing Contractors Association
34. NSF  National Sanitation Foundation
35. OSHA  Occupational Safety and Health Administration
36. SMACNA  Sheet Metal and Air Conditioning Contractors' National Association, Inc.
37. TEMA  Tubular Exchanger Manufacturers Association
38. TIMA  Thermal Insulation Manufacturers Association
39. UL  Underwriters Laboratories, Inc.
40. USDA  United States Department of Agriculture

D. See Division 23, HVAC individual Sections for additional references.
E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

F. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

G. Piping and duct insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.4 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as specific individual Division 23, HVAC Sections.

B. In addition:

1. "No Exceptions Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

2. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail or posted to ftp site. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.

3. Product Data: Provide Manufacturer's descriptive literature for products specified in Division 23, HVAC Sections.

4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process,
Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.

b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 23, HVAC Specification Sections for specific items required in product data submittal outside of these requirements.

c. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.

d. For vibration isolation of equipment, list make and model selected with operating load and deflection.

e. See Division 23, HVAC individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.

6. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet Section 23 05 48, Vibration and Seismic Controls for HVAC Equipment. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Part 3 of this Section.

7. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required by Division 23, HVAC Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.

8. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
9. Substitutions and Variation from Basis of Design:
   a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
   b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

10. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, equipment, ductwork and piping layout plans, and control wiring diagrams. Reference Individual Division 23, HVAC Specification Sections for additional requirements for shop drawings outside of these requirements.
   a. Provide Shop Drawings indicating access panel locations for items that require Code or maintenance access, size and elevation for approval prior to installation.

11. Samples: Provide samples when requested by individual Sections.

12. Resubmission Requirements:
   a. Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
1) Resubmit for review until review indicates no exceptions taken or make "corrections as noted".

2) When submitting drawings for Engineers re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

13. Operation and Maintenance Manuals, Owners Instructions:

a. Submit, at one time, one bound copy and electronic files (PDF format) on CD/DVD of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Include valve charts. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.

2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: belts, motors, lubricants, and filters.

3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Sections.

4) Include product certificates of warranties and guarantees.

5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub assemblies.

6) Include copy of startup and test reports specific to each piece of equipment.

7) Include copy of final air and water systems balancing log along with pump, fan and distribution system operating data.
8) Include commissioning reports.

9) Include copy of valve charts/schedules.

10) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer’s hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 23 00 00, HVAC Basic Requirements Article titled "Demonstration".

c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

14. Record Drawings:

a. Maintain at site at least one set of drawings for recording “As-constructed” conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical items. Include items changed by field orders, supplemental instructions, and constructed conditions.

b. Record Drawings are to include equipment and fixture/connection schedules, control dampers, fire smoke dampers, fire dampers, valves, bottom of pipe, duct and equipment elevations and dimensioned locations for all distribution systems (hydronic and air). Invert elevations and dimensioned locations for underground systems below grade to 5-feet outside building that accurately reflect "as constructed or installed" for project.

c. At completion of project, input changes to original project CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD disk and drawings upon substantial completion.
d. See Division 23, HVAC individual Sections for additional items to include in record drawings.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State, Federal and other applicable laws and regulations.

B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

E. UL and CSA Compliance: Provide products which are UL and CSA listed.

F. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

G. Provide safety controls required by National Boiler Code (ASME CSD 1) for boilers and water heaters with an input of 400,000 BTUH and higher.

1.6 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Contracting and Procurement Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.
1.7 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, equipment, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension, and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Advise Architect in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.

D. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide like items from one manufacturer, including but not limited to pumps, fans, valves, control devices, air handlers, vibration isolation devices, etc.

2.2 MATERIALS

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer’s printed catalog data and are to be UL, ETL, or CSA approved or have adequate approval or be acceptable by State, County, and City authorities.

B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer’s names denote character and quality of equipment desired and are not to be construed as limiting competition.

D. Hazardous Materials:
   1. Comply with local, State of California, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.

3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

2.3 ACCESS PANELS

A. See Division 01, General Requirements and Division 08, Openings for products and installation requirements.

B. Confirm Access Panel requirements in Division 01, General Requirements, Division 08, Openings and individual Division 23, HVAC Sections. In absence of specific requirements in Division 01, General Requirements, comply with the following:

1. Provide flush mounting access panels for service of systems and individual components requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly.
   a. Ceiling access panels to be minimum 24-inch by 24-inch required and approved size.
   b. Wall access panels to be minimum of 12-inch by 12-inch required and approved size.
   c. Provide screwdriver operated catch.
   d. Manufacturers and Models:
      1) Drywall: Karp KDW.
      2) Plaster: Karp DSC-214PL.
      3) Masonry: Karp DSC-214M.
      4) 2 hour rated: Karp KPF-350FR.
      5) Manufacturers: Milcor, Elmdor, Acudor or approved equivalent.
PART 3 - EXECUTION

3.1 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Install equipment having components requiring access (i.e., drain pans, drains, control operators, valves, motors and vibration isolation devices) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspace which would impede or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions including all appurtenances recommended in manufacturer's installation instructions, at no additional charge to Owner. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

   a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork Sections. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.

   b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.

   c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:
1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:
   a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Pipe Installation:

1. Coordinate work to account for expansion and contraction of piping materials and building, as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, seismic flexible joints, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building. Verify construction phasing, type of building construction products and rating for coordinating installation of piping systems.

2. Include provisions for servicing and removal of equipment without dismantling piping.

G. Plenums:

1. In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.2 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Section 23 05 48, Vibration and Seismic Controls for HVAC Equipment, Division 13, Special Construction, Section 23 00 00, HVAC Basic Requirements and individual Division 23 HVAC Sections.

B. Equipment Importance Factor: 1.0.

C. General:

1. Confirm Building Occupancy Category and Seismic Design Category with Structural Engineer.
2. Earthquake resistant designs for HVAC (Division 23) equipment and distribution, i.e. motors, ductwork, piping, equipment, etc. conform to regulations of jurisdiction having authority.

3. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.

4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping equipment and water heaters. Submit Shop Drawings along with equipment submittals.

5. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details. Coordinate exact design requirements with project Structural Engineer.

D. Piping and Ductwork:


E. Equipment:

1. Provide means to prohibit excessive motion of equipment during earthquake.

3.3 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground system installation prior to backfilling.

2. Prior to covering walls.

3. Prior to ceiling cover/installation.
4. After major equipment is installed.

5. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch:

1. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.4 CONTINUITY OF SERVICE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. During remodeling or addition to existing structures, while existing structure is occupied, current services to remain intact until new construction, facilities or equipment is installed.

2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping and ductwork, and wiring to point of connection. Where existing systems are being utilized, clean existing distribution systems (ductwork, piping, fans, air handlers) prior to connecting new ductwork or piping.

3. Coordinate transfer time to new service with Owner. If required, perform transfer during off peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum.

   a. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.

4. Organize work to minimize duration of power interruption.

3.5 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of
proposed penetration locations and submit scan results including proposed penetration locations to project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).

2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section and will be performed by skilled craftsmen of each respective trade in conformance with appropriate Division of Work.

3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.

4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.

5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.6 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

B. Maintain design intent where equipment other than as shown as Basis of Design in Contract Documents is provided. Where equipment requires ductwork or piping arrangement, controls/control diagrams, or sequencing different from that indicated in Contract Documents, provide at no additional cost to Owner.

3.7 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or
materials that become damaged due to water, dirt, and/or dust as a result of improper storage to be replaced before installation.

2. Protect equipment and pipe to avoid damage. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3. Protect bright finished shafts, bearing housings and similar items until in service.

3.8 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.9 CLEANING

A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.10 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.
B. Install equipment and fixtures in accordance with manufacturer’s installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer’s recommended clearances.

C. Start up equipment, in accordance with manufacturer’s start-up instructions, and in presence of manufacturer’s representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

1. Do not place equipment in sustained operation prior to initial balancing of HVAC systems.

D. Provide miscellaneous supports/m Metals required for installation of equipment, piping and ductwork.

3.11 PAINTING

A. Confirm Painting requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Ferrous Metal: After completion of work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.

2. After acceptance by Authority Having Jurisdiction (AHJ), In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.

3. See individual equipment Specifications for other painting.

4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

5. Piping and Ductwork: Clean, primer coat and paint exposed piping and ductwork on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

6. Covers: Covers such as manholes, cleanouts and the like will be furnished with finishes which resist corrosion and rust.
3.12 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Coordinate locations/sizes of access panels with Architect prior to work.

3.13 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing Conditions. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Scope:
   a. It is the intent of these documents to provide necessary information and adjustments to the HVAC system required to meet code, and accommodate installation of new work.
   b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
   c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

2. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.

3. Unless specifically indicated on Drawings, remove exposed, unused ductwork and piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap and patch surfaces to match surrounding finish.

4. Unless specifically indicated on Drawings, remove unused equipment, fixtures, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).
3.14 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
   a. Testing and Balancing Reports
   b. Cleaning
   c. Operation and Maintenance Manuals
   d. Training of Operating Personnel
   e. Record Drawings
   f. Warranty and Guaranty Certificates
   g. Start-up/Test Document
   h. Commissioning Reports

3.15 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Operation and Maintenance Manuals.

2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.
3.16 LETTER OF CONFORMANCE

A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that HVAC items were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

3.17 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

3.18 TEMPORARY HEATING, COOLING AND HUMIDITY CONTROL

A. Provide temporary heating, cooling, controls, humidification and dehumidification as required to facilitate the construction of the project. Size and select temporary system based on the requirements of the various trades during construction. This includes, but is not limited to, drywall, case work, wood flooring and wood finishes that are subject to warping. Size and install system to prevent mold growth. Coordinate the location of the temporary system. The house system can be used. Develop a procedure for how the house system will be used including a sketch depicting the house system, how filtration will be used to prevent construction debris from entering the system and how often the filters will be changed, how the ductwork will be cleaned after use to insure a clean system is turned over to the Owner and how the units are sized. Submit this procedure to the Mechanical Engineer for review. Follow National Air Duct Cleaners Association (NADCA) duct cleaning procedures and guidelines. Warranties for the house system, if new, to commence when the Owner moves in if house system is used as the means to maintain the climate within the building during construction. Include this warranty requirement in the original bid or proposal amount. Coordinate and provide any temporary power, controls, ductwork, piping, plumbing anchorage, miscellaneous steel and structural supports required to support the temporary system. Installation of the system to comply with all applicable codes and be acceptable to the Authority Having Jurisdiction (AHJ).

END OF SECTION
SECTION 23 05 16
EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:

1. Flexible Expansion Loop (For Thermal and Seismic Applications), Steel Piping
2. Flexible Expansion Loop (For Thermal and Seismic Applications), Copper Piping
3. Accessories

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements, apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Design Data: Indicate selection calculations.

2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

3. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   a. Extra Packing for Packed Expansion Joints: One set for each joint.
1.5 QUALITY ASSURANCE
A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY
A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Mercer Rubber Company
B. Metraflex Company
C. Mason
D. Hyspan
E. Advanced Thermal Systems Inc. for Ball Joints
F. Or approved equivalent.

2.2 FLEXIBLE EXPANSION LOOP (FOR THERMAL AND SEISMIC APPLICATIONS) - STEEL PIPING
A. Construction: Two flexible Sections of hose and braid, two 90 degree elbows and a 180 degree return designed so piping does not change direction, but maintains course along a single axis. Use Vee Loop where space is limited. No thrust loads to be imported to system support anchors or building structure.
B. Inner Hose: 304 stainless steel, close pitch, annular corrugated hose.
D. Minimum Pressure Rating: 125 PSI at 70 degrees F.
E. Joint: ANSI Class 150 carbon steel flanges.
F. Size: Use pipe sized units.
G. Support: Center support at bottom of 180 degree return.
H. Drain/Air Release: At bottom of 180 degree return.
I. For Natural Gas: Approved by the CSA and complying with UL536.

J. Basis of Design: Metraflex Metraloop, for Vee configuration Mason-Mercer VFL.

2.3 FLEXIBLE EXPANSION LOOP (FOR THERMAL AND SEISMIC APPLICATIONS) - COPPER PIPING

A. Construction: Two flexible Sections of hose and braid, two 90 degree elbows and a 180 degree return designed so piping does not change direction, but maintains course along a single axis. Use Vee Loop where space is limited. No thrust loads to be imported to system support anchors or building structure.

B. Inner Hose: Bronze, close pitch, annular corrugated hose.

C. Exterior Sleeve: Braided bronze.

D. Minimum Pressure Rating: 125 PSI at 70 degrees F.

E. Joint: Sweat ends.

F. Size: Use pipe sized units.

G. Support: Center support at bottom of 180 degree return.

H. Basis of Design: Metraflex Metraloop, for Vee configuration Mason-Mercer VCPSB.

2.4 ACCESSORIES

A. Stainless Steel Pipe: ASTM A 269.

B. Pipe Alignment Guides:

  1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1-inch thick insulation, minimum 3-inches travel.

C. Swivel Joints:

  1. Fabricated steel, cast steel or bronze body, double ball bearing race, field lubricated, with rubber (Buna-N) O-ring seals.

PART 3 - EXECUTION

3.1 EXPANSION FITTING INSTALLATION

A. Install expansion fittings according to manufacturer's written instructions.

B. Install expansion fittings in sizes matching pipe size in which they are installed.

C. Align expansion fittings to avoid end-loading and torsional stress.

D. Install in accordance with EJMA (Expansion Joint Manufacturer's Association) Standards.

3.2 PIPE BEND AND LOOP INSTALLATION

A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Attach pipe bends and loops to anchors.


2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

3.3 SWING CONNECTIONS

A. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

B. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.

C. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.4 GUIDE INSTALLATION

A. Install guides on piping adjoining expansion fittings and loops.

B. Attach guides to pipe and secure to building structure.

3.5 ANCHOR INSTALLATION

A. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.

C. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.

D. Install pipe anchors according to expansion fitting manufacturer's written instructions if expansion fittings are indicated.

E. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION
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SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:

1. Piping and Ductwork Hangers and Supports
2. Thermal-Hanger Shield Inserts
3. Channel Support Systems
4. Wall and Floor Sleeves
5. Anchors
6. Flashing
7. Miscellaneous Metal
8. Miscellaneous Materials

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

2. Terminology: As defined in MSS SP-90 "Guidelines on Terminology for Pipe Hangers and Supports".
3. Install ductwork and piping per SMACNA's requirements.
4. Hanger spacing installation and attachment to meet all manufacturers requirements and Code requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Welding:

   a. Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Welding for Hangers:

   a. Qualify procedures and personnel according to AWS D9.1, Sheet Metal Welding Code for duct joint and seam welding.

3. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, duct support equipment hangers/supports, and seismic restraint by a qualified Structural Professional Engineer.

   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 hangers and supports that are similar to those indicated for this Project in material, design, and extent.

4. Manufacturers regularly engaged in the manufacture of bolted metal framing support systems, whose products have been in satisfactory use in similar service for not less than 10 years.

5. Support systems to be supplied by a single manufacturer.
1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.7 PERFORMANCE REQUIREMENTS

A. General - Provide pipe, ductwork and equipment hangers and supports in accordance with the following:

1. When supports, anchorages, and seismic restraints for equipment, and supports, anchorages, and seismic restraints for conduit, piping, and ductwork are not shown on the Drawings, the contractor is responsible for their design.

2. Connections to structural framing not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Engineered Support Systems:

1. Support frames such as pipe racks or stanchions for piping, ductwork and equipment which provide support from below.

2. Equipment, ductwork and piping support frame anchorage to supporting slab or structure.

C. Provide channel support systems, for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

D. Provide heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

E. Provide seismic restraint hangers and supports for piping, ductwork and equipment. See Section 23 05 48.

F. Obtain approval from AHJ for seismic restraint hanger and support system to be installed for piping and equipment. See Section 23 05 48.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Pipe and Ductwork Hangers and Supports:

1. B-Line Systems, Inc.
2. Anvil International
3. Erico Co., Inc.
4. Or approved equivalent.

B. Channel Support Systems:
1. B-Line Systems, Inc.
2. Anvil International, Anvil-Strut
4. Unistrut Corp.
5. Or approved equivalent.

C. Thermal-Hanger Shield Inserts:
1. Erico Hanger Co., Inc.
2. Pipe Shields, Inc.
3. Rilco Manufacturing Co., Inc.
4. Or approved equivalent.

D. Powder-Actuated Fastener Systems:
1. Gunnebo Fastening Corp.
2. Hilti, Inc.
3. ITW Ramset/Red Head.
5. Or approved equivalent.

E. Freestanding Roof Supports:
1. Erico Hanger Co., Inc.
3. Or approved equivalent.

F. Below Grade Pipe Sleeves:

1. Thunderline Corporation "Link Seal".

2. Or approved equivalent.

2.2 PIPING AND DUCTWORK HANGERS AND SUPPORTS

A. Horizontal Piping Hangers and Supports - Horizontal and Vertical Piping, and Hanger Rod Attachments:

1. Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems and in accordance with manufacturer's published product information.

2. Use only one type by one manufacturer for each piping service.

3. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping.

4. Provide copper-plated hangers and supports for uninsulated copper piping systems.

B. Pipe Hangers, Slides and Clamps:

1. Hanger Rods: Hanger rods continuously threaded or threaded ends only in concealed spaces and threaded ends only in exposed spaces; finish electro-galvanized or cadmium-plated in concealed spaces and prime painted in exposed spaces; sizes per NSS.

2. Hanger Rod Couplings: Anvil Figure 136, B-Line Figure B3220, or approved equivalent; malleable iron rod coupling with elongated center sight gap for visual inspection; to have same finish as hanger rods.

3. Pipe Rings for Hanger Rods: Pipe sizes 2-inch and smaller, Anvil Figures 69 or 104, or equivalent of Erico Hanger or approved equivalent. Pipe sizes 2-1/2-inches and larger, clevis type hangers with adjustable nuts on rod. Anvil figure 260. Pipe rings to have same finish as hanger rods.

4. Pipe Slides: Anvil, reinforced Teflon slide material (3/32-inch minimum thickness) bonded to steel; highly finished steel or stainless steel contact surfaces to resist corrosion; 60-80 PSI maximum active contact surface loading;
steel parts 3/16-inch minimum thickness; attachment to pipe and framing by welding.

5. Pipe Guides:
   a. Furnish and install pipe guides on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides securely to pipe and structure. Contact with chilled water pipe not to permit heat to be transferred in sufficient quantity to cause condensation on any surface.
   b. Furnish and install guides approximately 4 pipe diameters (first guide) and 14 diameters (second guide) away from each end of expansion joints. Guides are not to be sued as supports and are in addition to other pipe hangers and supports.

6. Channel Type Pipe Hanging System: Framing members No. 12 gauge formed steel channels, 1-5/8-inch square, conforming to ASTM A570 GR33, one side of channel to have a continuous slot within turned lips; framing nut with grooves and spring 1/2-inch size, conforming to ASTM 675 GR60; screws conforming to ASTM A307; fittings conforming to ASTM A575; parts enamel painted or electro-galvanized.

C. Building Attachments:
   1. Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions and in accordance manufacturer's published product information.
   2. Select size of building attachments to suit hanger rods.

D. Saddles and Shields:
   1. Factory fabricated saddles or shields under piping hangers and supports for insulated piping.
   2. Size saddles and shields for exact fit to mate with pipe insulation. 1/2 round, 18 gauge, minimum 12-inches in length (4-inch pipe and larger to be three times longer than pipe diameter).

E. Roller Hangers:
   1. Adjustable roller hanger. Black steel yoke, cast iron roller. MSS Type 41.

F. Beam Clamps:
1. MSS Type 19 and 23, wide throat, with retaining clip.
2. Universal Side Beam Clamp: MSS Type 20.

G. Below Ground:

2. Rod: 5/8-inch stainless steel Type 18-8.

H. Pipe Hangers Size 2-inches and Smaller:

1. Adjustable swivel ring hanger, UL listed. Erico 100 or 101.

I. Pipe Hangers Size 2-1/2-inches and Larger:

1. Adjustable clevis type, UL listed. Erico 400.

J. Riser Clamps:

1. Steel, UL listed. MSS Type 8. Erico 510 or 511. Copper coated; Erico 368.

K. Plumbers Tape:

1. Not permitted as pipe hangers or pipe straps.

L. Freestanding Roof Pipe Supports:

1. Polyethylene high-density UV resistant quick "pipe" block with foam pad.
2. Recommended installation is for pipe blocks to be freestanding.
3. Piping 3-inches and larger mounted on pipe supports.

2.3 THERMAL-HANGER SHIELD INSERTS

A. 100-PSI (690-kPa) minimum compressive strength insulation, encased in sheet metal shield.
1. Material for Cold Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with vapor barrier.


3. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.

4. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.

5. Insert Length: Extend 2-inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 CHANNEL SUPPORT SYSTEMS

A. Concrete Inserts:

1. Malleable iron body, hot tipped galvanized finish. Lateral adjustment. MSS Type 18.

B. Continuous Concrete Insert:


2.5 WALL AND FLOOR SLEEVES

A. Below Grade or High Water Table Areas:

1. "Link-Seal" Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal. Provide Type S unless otherwise noted. Thunderline Corporation, or approved equivalent.

B. Pre-Engineered Firestop Pipe Penetration Systems: UL listed assemblies for maintaining fire rating of piping penetrations through fire-rated assemblies. Comply with ASTM E814.

C. Fabricated Accessories:

1. Steel Pipe Sleeves: Fabricate from Schedule 40 black or galvanized steel pipe. Remove end burrs by grinding.

2. Sheet Metal Pipe Sleeves: Fabricate from G-90 galvanized sheets closed with lock-seam joints. Provide the following minimum gauges for the sizes indicated:
a. Sleeve Size 4-inches in Diameter and Smaller: 18 gauge.

b. Sleeve Sizes 5-6-inches: 16 gauge.

c. Sleeve Sizes 7-inches and Larger: 14 gauge.

d. Fire-Rated Safing Material.

1) Rockwool Insulation: Complying with FS-HH-I-558, Form A, Class IV, 6 pounds per cubic foot density with melting point of 1985 degrees F and K value of 0.24 at 75 degrees F.

2) Calcium Silicate Insulation: Noncombustible, complying with FS-HH-I-523, Type II, suitable for 100 degrees F to 1200 degrees F service with K value of 0.40 at 150 degrees F.

2.6 ANCHORS

A. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer.

B. Anchor Bolts:

1. Anchor Bolts (Cast-In-Place): Steel bolts, ASTM A307. Nuts to conform to ASTM A194. Design values for shear and tension not more than 80 percent of the allowable listed loads.

2. Anchor (Expansion) Bolts: Carbon steel to ASTM A307; nut to conform to ASTM A194; drilled-in type. Design values for shear and tension not more than 80 percent of the allowable listed loads.


2.7 FLASHING

A. Steel Flashing: 26 gauge galvanized steel.

B. Safes: 8 mil thick neoprene.

C. Caps: Steel, 22 gauge minimum, 16 gauge at fire-resistant structures.
2.8 MISCELLANEOUS METAL

A. Miscellaneous Metal: Provide miscellaneous metal items specified hereunder, including materials, fabrication, fastenings and accessories required for finished installation, where indicated on drawings or otherwise not shown on drawings that are necessary for completion of the project. The Contractor is responsible for their design.

1. Fabricate miscellaneous units to size shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

B. Structural Shapes: Where miscellaneous metal items are needed to be fabricated from structural steel shapes and plates, provide members constructed of steel conforming with requirements of ASTM A36 or approved equivalent.

C. Steel Pipe: Provide seamless steel pipe conforming to requirements of ASTM A53, Type S, Grade A, or Grade B. Weight and size required as specified.

D. Fasteners: Provide fasteners of types as required for assembly and installation of fabricated items; surface-applied fasteners are specified elsewhere.

E. Bolts: Low carbon steel externally and internally threaded fasteners conforming with requirements of ASTM A307; include necessary nuts and plain hardened washers. For structural steel elements supporting mechanical material or equipment from building structural members or connection thereto, use fasteners conforming to ASTM A325.

F. Miscellaneous Materials: Provide incidental accessory materials, tools, methods, and equipment required for fabrication.

G. Provide hot dipped galvanized components for items exposed to weather. Use materials compatible with system being supported (i.e. aluminum for aluminum ductwork, stainless steel for stainless steel ductwork).

H. Use straps, threshold rods and wire with sizes required by SMACNA to support ductwork.

2.9 MISCELLANEOUS MATERIALS

A. Powder-Actuated Drive-Pin Fasteners: Powder actuated type, drive pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

C. Grout: ASTM C1107, Grade B, factory mixed and packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
   1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
   2. Properties: Nonstaining, noncorrosive, and non gaseous.
   3. Design Mix: 5000-PSI (34.5-MPa), 28-day compressive strength.

D. Provide galvanized components for items exposed to weather.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify building materials to have hangers and attachments affixed in accordance with hangers to be used. Provide supporting calculations.

3.2 PREPARATION

A. Examine Drawings and coordinate for verification of exact locations of fire and smoke rated walls, partitions, floors and other assemblies. Indicate, by shading and labeling on Record Drawings such locations and label as "1-Hour Wall," "2-Hour Fire/Smoke Barrier," and the like. Determine proper locations for piping penetrations. Set sleeves in place in new floors, walls or roofs prior to concrete pour or grouting.

B. Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate proper placement of inserts, anchors and other building structural attachments.

3.3 FABRICATION - MISCELLANEOUS METALS

A. General: Verify dimensions prior to fabrication. Form metal items to accurate sizes and configurations as indicated on drawings and otherwise required for proper installation; make with lines straight and angles sharp, clean and true; drill, countersink, tap, and otherwise prepare items for connections with work of other trades, as required. Fabricate to detail of structural shapes, plates and bars; weld joints where practicable; provide bolts and other connection devices required. Include anchorages; clip angles, sleeves, anchor plates, and similar devices. Hot dipped galvanize after fabrication items installed in exterior locations. Set accurately in position as required and anchor securely to building construction. Construct items with joints formed for strength and
rigidity, accurately machining for proper fit; where exposed to weather, form to exclude water.

B. Finishes:

1. Ferrous Metal: After fabrication, but before erection, clean surfaces by mechanical or chemical methods to remove rust, scale, oil, corrosion, or other substances detrimental to bonding of subsequently applied protective coatings. For metal items exposed to weather or moisture, galvanize in manner to obtain G90 zinc coating in accordance with ASTM A123. Provide other non-galvanized ferrous metal with 1 coat of approved rust-resisting paint primer, in manner to obtain not less than 1.0 mil dry film thickness. Touch-up damaged areas in primer with same material, before installation. Apply zinc coatings and paint primers uniformly and smoothly; leave ready for finish painting as specified elsewhere.

2. Metal in contact with Concrete, Masonry and Other Dissimilar Materials:
   
a. Where metal items are to be erected in contact with dissimilar materials, provide contact surfaces with coating of an approved zinc-chromate primer in manner to obtain not less than 1.0 mil dry film thickness, in addition to other coatings specified in these specifications.

3. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanized repair paint to comply with ASTM A780.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24-inches of each elbow and within 48-inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16-feet (5 m) and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. Install concrete inserts before placing concrete.

E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

F. Do not use powder-actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4-inches thick.

G. Provide aluminum supports for aluminum ductwork.
H. Provide stainless steel supports for stainless steel ductwork.

I. Floor supports in mechanical rooms to be elevated 1-inch above finish floor and void space filled with masonry grout.

J. Use double nuts and lock washers on threaded rod supports.

K. Hang rectangular sheet-metal ducts with a cross sectional area of less than 7 SF with galvanized strips of No. 16 USS gauge steel 1-inch wide, and larger ducts with steel angles and adjustable hanger rods similar to piping hangers. Support at a maximum of 8-feet on center.

L. Anchor ducts securely to building in such a manner as to prevent transmission of vibration to structure. Do not connect duct hanger straps to roof deck. Do not support ducts from other ducts, piping or equipment.

M. Attach strap hangers installed flush with end of sheet-metal duct run to duct with sheet-metal screws.

N. Construct exterior ductwork or ductwork which is otherwise exposed to weather watertight and slope 1/4-inch per foot to avoid standing water.

O. Exposed ductwork hung in clean areas such as sanitary areas, pharmaceutical areas, wash down areas or food process areas to be installed using double end, food grade trapeze hanger rods suitable for use with food grade strut.

3.5 INSTALLATION

A. Building Attachments:

1. Install within concrete or on structural steel or wood. Attachment to Wood Structure: Anvil side beam bracket Figure 202 for attachment to wooden beam or approved attachment for a wood structure.

2. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

3. Install concrete inserts before concrete is placed; fasten insert secure to forms. Where concrete with compressive strength less than 2500 PSI is indicated, install reinforcing bars through openings at top in inserts.

4. Fasteners to be installed per the ESR Report. Call for special inspections when required by the Report or when required by the Structural Engineer.
B. Hangers and Supports:

1. Pipe Hanger and Support Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. For horizontally hung grooved-end piping, provide a minimum of 2 hangers per pipe section.

2. Pipe Ring Diameters:
   
a. Uninsulated and Insulated Pipe, except where oversized pipe rings are specified: Ring inner diameter to suit pipe outer diameter.

b. Insulated Piping Where Oversized Pipe Rings are Specified and Vibration Isolating Sleeves: Ring inner diameter to suit outer diameter of insulation or sleeve.

3. Oversize Pipe Rings: Provide oversize pipe rings of 2-inch and larger size.


5. Steel Backing in Walls: Provide steel backing in walls to support fixtures and piping hung from steel stud walls.

6. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
   
a. Field assemble and install according to manufacturer's written instructions.

7. Pipe Guides:
   
a. Install on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides to pipe structure. Contact with chilled water pipe does not permit heat to be transferred in sufficient quantity to cause condensation on any surface.

b. Install approximately 4 pipe diameters (first guide) and 14 diameters (second guide) away from each end of expansion joints. Do not use as supports. Provide in addition to other required pipe hangers and supports.

8. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field fabricated, heavy-duty trapezes.
a. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

b. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

9. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers. Maximum spacings: MSS SP-58.

10. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe.

11. Do not support piping from other piping.

12. Fire protection piping will be supported independently of other piping.

13. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

14. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-58. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

15. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

16. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

17. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

18. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
19. **Load Distribution:** Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

20. **Pipe Slopes:** Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping" is not exceeded.

21. **Insulated Piping:** (comply with the following)
   
   a. Attach clamps and spacers to piping.
      
      1) Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      
      2) Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      
      3) Do not exceed pipe stress limits according to ASME B31.9.
   
   b. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      
      1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
   
   c. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields to span arc of 180 degrees.
      
      1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
   
   d. **Shield Dimensions for Pipe, not less than the following:**
      
      1) NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12-inches long and 0.048-inch thick.
      
      2) NPS 4 (DN100): 12-inches long and 0.06-inch thick.
      
      3) NPS 5 and NPS 6 (DN125 and DN150): 18-inches long and 0.06-inch thick.
4) NPS 8 to NPS 14 (DN200 to DN350): 24-inches long and 0.075-inch thick.

5) NPS 16 to NPS 24 (DN400 to DN600): 24-inches long and 0.105-inch thick.

e. Pipes NPS 8 (DN200) and Larger: Include wood inserts.

f. Insert Material: Length at least as long as protective shield.

g. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

22. Equipment Clearances: Do not route ductwork, equipment, or piping through electrical rooms, transformer vaults, elevator equipment rooms, IT rooms, MPOE rooms, or other electrical or electronic equipment spaces and enclosures and the like. Within equipment rooms, provide minimum 3-feet lateral clearance from all sides of electric switchgear panels. Do not route ductwork, equipment, or piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with Electrical and coordinate exact ductwork, equipment or pipe routing to provide proper clearance with such items.

23. Hanger Spacing per more stringent of Code requirements, manufacturer's requirements, or MSS SP-58.

24. Pipe supports and hanger spacing (pipe supported from structure or floor-supported) to meet the requirements of 1.3 Reference and Standards above.

25. See Section 23 31 00, HVAC Ducts and Casings for additional hanging and support requirements for ductwork.

C. Bolting:

1. General: Provide bored, drilled or reamed holes for bolting to miscellaneous structural metals, frames or for mounts or supports. Flame cut, punched or hand sawn holes will not be accepted.

D. Anchor Bolts:

1. General: Install anchor bolts for mechanical equipment, piping and ductwork as required. Tightly fit and clamp base-supported equipment anchor bolts at equipment support points. Provide locknuts where equipment, piping and ductwork are hung.
2. Anchor bolts (Cast-In-Place): Embed anchor bolts in new cast-in-place concrete to anchor equipment. Install a pipe sleeve around the anchor bolt for adjustment of the top 1/3 of the bolt embedment; sizes and patterns to suit the installation conditions of the equipment to be anchored.

E. Pipe Anchors:

1. General: Provide anchors to fasten piping which is subject to expansion and contraction, and adjacent to equipment to prevent loading high forces onto the equipment.

F. Pipe Curb Assemblies:

1. Provide prefabricated units for roof membrane and insulation penetrations related to equipment. Coordinate with roofing system. Set supports on the structural deck. Do not set supports on insulation or roofing. Provide level supports by prefabricated pitch built into the curb.

2. Pipe Curb Assemblies: Provide for piping and electrical conduit which penetrates the structural roof deck to service equipment above the roof level (i.e., piping, electrical power and control wiring). Meet requirements of roof warranty.

3. Piping above roof to be supported with freestanding roof pipe supports unless detailed otherwise.

G. Escutcheon Plates: Install around horizontal and vertical piping at visible penetrations through walls, partitions, floors, or ceilings, including penetrations through closets, through below ceiling corridor walls, and through equipment room walls and floors.

H. "Link-Seal" Pipe Sleeves: Install at floor/below grade piping penetrations. Provide manufacturer's sleeve appropriate to seal type for pre-cast penetrations.

I. Fabricated Pipe Sleeves:

1. Provide either steel or sheet metal pipe sleeves accurately centered around pipe routes. Size such that piping and insulation, if any, will have free movement within the sleeve, including allowance for thermal expansion. 
Sleeve diameter to be determined by local seismic clearance requirements, and by waterproofing requirements.

2. Length: Equal to thickness of construction penetrated, except extend floor sleeves 1-inch above floor finish.
3. Provide temporary support of sleeves during placement in concrete and other work around sleeves. Provide temporary end closures to prevent concrete and other materials from entering pipe sleeves.

4. Seal each end airtight with a resilient nonhardening sealer, UL listed, fire rated ASTM 814.

J. Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:

1. Install fabricated pipe sleeve.

2. After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve I.D. with specified material.

3. Seal each end airtight with a resilient nonhardening UL listed fire resistant ASTM 814.

K. Piping penetrations through fire-rated (1 to 3 hour) assemblies:

1. Select and install pre-engineered pipe penetration system in accordance with the UL listing and manufacturer's recommendation.

2. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.

L. Vertical Piping:

1. Support with U-clamps fastened to wall to hold piping away from wall unless otherwise approved.

2. Riser clamps to be directly under fitting or welded to pipe.

3. Riser to be supported at each floor of penetration.

3.6 MISCELLANEOUS METALS

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction;
including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required. Avoid cutting concrete reinforcing when drilling for inserts. Reference structural drawings and reinforcing shop drawings and determine locations of stirrups prior to drilling into concrete.

C. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items, which are to be built into concrete masonry or similar construction.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.


1. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.

2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.7 ADJUSTING AND PAINTING

A. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping, ductwork and equipment to proper level and elevations.

B. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted.

3.8 FLASHING

A. Flash and counterflash where piping, ductwork and equipment passes through weather or waterproofed walls, floors, and roofs.

B. Provide 12-inches minimum height curbs for roof-mounted mechanical equipment. Flash and counter flash with galvanized steel, soldered and waterproofed.
3.9 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.10 TESTING

A. Powder-Actuated Inserts: Test powder-actuated insert attachments with a minimum load of 100 pounds.

END OF SECTION
SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:
   1. Vibration Isolation
   2. Seismic Restraint Devices
   3. Factory Finishes

B. General:
   1. Vibration isolation for mechanical ductwork, piping, and equipment.
   2. Seismic restraint for mechanical ductwork, piping, and equipment.
   3. Seismic Certification for equipment, hangers and systems
   4. Special inspections for systems.

C. Scope of Work:
   1. Vibration isolation and seismic restraint of new equipment and systems within project boundary defined in architectural drawings.
   2. Vibration isolation and seismic restraint of new equipment and systems in existing buildings to points of connection with existing systems.
   3. Seismic restraint of existing systems and equipment shown on drawings, within project boundary defined in architectural drawings.
   4. Provide supplementary structural steel for seismic restraint systems.
      a. No hanging from roof deck is permitted on this project, unless specifically allowed by Structural Engineer of Record in writing prior to bid.
1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Vibration Isolation:

   a. Product data: Provide catalog data indicating size, type, load and deflection of each isolator; and percent of vibration transmitted based on lowest disturbing frequency of equipment.

   b. Shop Drawings: Showing complete details of construction for steel and concrete bases including:

      1) Fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.

      2) Equipment mounting holes.

      3) Dimensions.

      4) Size and location of concrete and steel bases and curbs.

      5) Isolation selected for each support point.

      6) Details of mounting brackets for isolator.

      7) Weight distribution for each isolator.

      8) Details of seismic snubbers.

      9) Code number assigned to each isolator.
c. Design calculations: Provide calculations for selecting vibration isolators and for designing vibration isolation bases.

2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.

3. Seismic Restraint:
   a. Shop Drawings: Show compliance with requirements of Quality Assurance article of this Section. Shop drawings to be stamped by a professional Structural or Civil Engineer licensed in State of California.
   b. Calculations: Submit seismic calculations indicating restraint loadings resulting from design seismic forces. Include anchorage details and indicate quantity, diameter, and depth of penetration of anchors. Calculations certified by professional Structural or Civil Engineer licensed in State of California.

4. Seismic Restraint Details: Detail fabrication and attachment of seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

5. Submittals for Interlocking Snubbers: Include load deflection curves up to 1/2-inch deflection in x, y and z planes.


7. Equipment Certification:
   a. Provide seismic certification for equipment as noted in Seismic Design Summary or schedules on Drawings.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Vibration Isolation:
   a. Except for packaged equipment with integral isolators, single manufacturer selects and furnishes isolation required.
b. Deflections indicated on drawings are minimum actual static deflections for specific equipment supported.

c. Isolator Stability:

1) Size springs of sufficient diameter to maintain stability of equipment being supported. Spring diameters not less than 0.8 of compressed height at rated load.

2) Springs have minimum additional travel to solid equal to 50 percent of rated deflection.

3) Springs support 200 percent of rated load, fully compressed, without deformation or failure.

d. Maximum Allowable Vibration Levels: Peak vibration velocities not exceed 0.08 in/sec. Correct equipment operating at vibration velocities that exceed this criteria.

2. Seismic Restraint:

a. Code and Standard Requirements:

1) Seismic restraint of equipment, piping, and ductwork to be in accordance with latest enacted version of ASCE 7-10.

b. Seismic Design Category:

1) Confirm Seismic Design Category with Structural Engineer.

c. Building Occupancy Category:

1) Confirm Building Occupancy Category with Structural Engineer.

d. Equipment Importance Factor: 1.0.

e. Certification: See Seismic Design Table or schedules on Drawings for equipment, systems, and seismic-restraint devices designated to have seismic certification / qualification. Horizontal and vertical load testing and analysis performed ASCE 7-10. Anchorage systems to bear an agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing or calculations, if preapproved ratings are not available. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be sealed by qualified licensed professional engineer in State of California. Testing and calculations
must include both shear and tensile loads and 1 test or analysis at 45 degrees to weakest mode.

f. Seismic restraint and anchorage of permanent equipment and associated systems listed below to building structure be designed to resist total design seismic force prescribed in local building code:

1) Floor- or roof-mounted equipment weighing 400 pounds or greater.

2) Suspended, wall-mounted or vibration isolated equipment weighing 20 pounds or greater.

3) In-line duct devices connected to ductwork weighing 75 pounds or greater.

4) Housekeeping slabs: provide reinforcement and anchorage to building structure.

g. Where required, seismic sway bracing of suspended duct and piping meet following:

1) Pipe and duct runs requiring seismic bracing have minimum of two traverse braces and one longitudinal brace. Longitudinal (or traverse) brace at 90 degree change in direction may act as traverse (or longitudinal) brace if located within 2-feet of change in direction.

2) Seismic bracing may not pass through seismic separation joint. Pipe or duct runs that pass through seismic separation joint must be restrained within 5-feet of both sides of separation.

3) Seismic brace assembly spacing not to exceed 40-feet transverse and 80-feet longitudinal.

h. Seismic restraints may be omitted from suspended piping and duct if following conditions are satisfied:

1) For piping or ducts supported by rod hangers 12-inches or less in length from top of duct to bottom of structural support. Top connections to structure have swivel joints, eye bolts, or vibration isolation hangers for entire length of system run.

2) Lateral motion of system will not cause damaging impact with surrounding systems or cause loss of system vertical support.
System must be welded steel pipe, brazed copper pipe, sheet metal duct or similar ductile material with ductile connections.

C. Seismic restraints, including anchors to building structure, be designed by registered professional Structural or Civil Engineer licensed in State of California. Design includes:

1. Number, size, capacity, and location of anchors for floor- or roof-mounted equipment. For curb-mounted equipment, provide design of attachment of both unit to curb and curb to structure.

2. Number, size, capacity, and location of seismic restraint devices and anchors for vibration-isolation and suspended equipment. Provide calculations and test data verifying horizontal and vertical ratings of seismic restraint devices.

3. Number, size, capacity, and location of braces and anchors for suspended piping and ductwork on as-built plan drawings.

4. Maximum seismic loads to be indicated on drawings at each brace location. Drawings bear stamp and signature of registered professional Structural or Civil Engineer who designed layout of braces.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.7 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.

B. Seismic Snubber Units: Furnish replacement neoprene inserts for snubbers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Vibration Isolation:

1. Amber/Booth

2. B-Line Systems, Inc.

4. Mason Industries Inc.
5. M.W. Sausse - Vibrex
6. Where Mason numbers are specified, equivalent products by listed manufacturers are acceptable.
7. Or approved equivalent.

B. Seismic Restraint Devices:
1. Amber/Booth
2. B-Line Systems, Inc.
3. Hilti, Inc.
5. Mason Industries, Inc.
6. California Dynamics Corporation
7. Cooper B-Line Tolco.
8. Unistrut Diversified Products Co.; Wayne Manufacturing Division.
9. M.W. Sausse - Vibrex
10. Or approved equivalent.

C. Seismic-Bracing/Restraint Devices/Systems for Equipment, Piping and Ductwork:
1. Amber-Booth
2. California Dynamics Corporation
3. Cooper B-Line, Inc.
4. Hilti, Inc.
5. Mason Industries, Inc.
7. Unistrut
8. ISAT, Inc.

9. Where Mason numbers are specified, equivalent products by listed manufacturers are acceptable.

10. Or approved equivalent.

2.2 VIBRATION ISOLATION

A. Type 1 - Neoprene Pad: Natural rubber waffle pads, arranged in single or multiple layers, 3/4-inch thick per layer with pattern repeating on ½-inch centers; 50 durometer hardness; maximum loading 60 PSI. 1/4-inch thick steel load distribution plate between layers and between pad and equipment, factory cut to sizes matching requirements of supported equipment. Molded bridge with neoprene anchor bolt bushing and flat washer face to prevent metal to metal contact. Number of layers required for equipment scheduled. Mason Type: Super WMH.

B. Type 2 - Neoprene Mount: Double-deflection type, with ductile-iron housing containing two separate and opposing, oil-resistant natural rubber or bridge bearing neoprene elements, factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Neoprene elements to prevent metal to metal contact during normal operation. Minimum static deflection of 0.20-inches. Mason Type: BR.

C. Type 3 - Spring: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of compressed height of spring at rated load.

2. Minimum Additional Travel: 50 percent of required deflection at rated load.

3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch-thick, natural rubber or bridge bearing neoprene isolator pad attached to baseplate underside. Baseplates limit floor load to 100 PSIG (690 kPa).

6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

7. Brackets: Manufacturer's standard bracket, utilize height saving brackets to accommodate height restrictions.
8. Mason Type: SLFH.

D. Type 4a - Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

1. Housing: Steel with resilient vertical-limit stops (out of contact during normal operation) to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch thick, natural rubber or bridge bearing neoprene isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation. Restraining bolts have large rubber grommets to provide cushioning in vertical and horizontal directions. A minimum clearance of 3/8-inch maintained around restraining bolts so as not to interfere with spring action.

2. Outside Spring Diameter: Not less than 80 percent of compressed height of spring at rated load.

3. Minimum Additional Travel: 50 percent of required deflection at rated load.

4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

6. Brackets: Manufacturer's standard bracket, utilize height saving brackets to accommodate height restrictions.

7. Mason Type: SLR.

E. Type 4b - Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.

1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint with neoprene acoustical cup, spring inspection ports and rebound adjustment ports.

2. Base: Factory drilled for bolting to structure.

3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch travel before contacting a resilient collar.

4. Brackets: Manufacturer's standard bracket, utilize height saving brackets to accommodate height restrictions.

5. Mason Type: SSLFH.
F. Type 5a - Restrained Elastomeric Hangers: Double-deflection type, with molded, oil-resistant natural rubber or bridge bearing neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range. Seismic rebound steel and bonded LDS rubber washer to limit upward seismic movement. Mason Type: RWHD.

G. Type 5c - Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 15 degrees of angular hanger-rod misalignment from vertical without binding or reducing isolation efficiency.

2. Outside Spring Diameter: Not less than 80 percent of compressed height of spring at rated load.

3. Minimum Additional Travel: 50 percent of required deflection at rated load.

4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.

8. Mason Type: RW30.

H. Type 7 - Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch thick, 60-durometer neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on isolation material of 500 PSIG (3.45 MPa) and for equal resistance in all directions. Mason Type: ADA.

I. Type 8 - Resilient Pipe Vertical Sliding Guide: Telescopic arrangement of 2 steel tubes separated by a minimum of 1/2-inch thick, 60-durometer neoprene. Factory set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction. Shear pin be removable and reinsertable to allow for selection of pipe movement. Guides be capable of motion to meet location requirements. Mason Type: VSG. Provide pipe expansion hangers to control load shifts as the riser expands or contracts, Mason HES.
J. Type FC-1, Flexible duct connectors. See Specification Section 23 33 00 Air Duct Accessories.

K. Type FC-2A, Flexible Pipe Connector, Steel:
   1. 321 stainless steel, close pitch, annular corrugated hose.
   2. Exterior Sleeve: 304 stainless steel, braided.
   3. Pressure Rating: 125 PSI at 70 degrees F for 12-inch and smaller pipe.
   5. Size: Use pipe sized units.
   6. Minimum Allowable Offset: 3/4-inch on each side of installed center line.
   7. Basis of Design: Metraflex Model MLP.

L. Type FC-2B, Flexible Pipe Connector, Copper:
   1. Inner Hose: Bronze, close pitch, annular corrugated hose.
   2. Exterior Sleeve: Braided bronze (for piping over 2-inches, to be 3 pound braided stainless steel).
   3. Minimum Allowable Pressure Rating: 125 PSI at 70 degrees F.
   5. Size: Use pipe sized units.
   7. Basis of Design: Metraflex Model BBS.

M. Type FC-2C, Flexible Pipe Connector, Gas:
   1. Inner Hose: 304 stainless steel.
   2. Exterior Sleeve: Braided, 304 stainless steel.
   3. Minimum Allowable Pressure Rating: 150 PSI at 70 degrees F up to 4-inch pipe.
5. Minimum Allowable Offset: 3/4-inch on each side of installed center line.

6. Basis of Design: Metraflex GASCT.

N. Type FC-3, Flexible Compensator, Double Sphere:

1. Body: Molded twin spherical type. Neoprene with internal cord or wire.

2. Minimum Pressure Rating, Sizes 2-inch to 12-inch: 225 PSI at 170 degrees F.

3. Minimum Pressure Rating, Sizes 14-inch to 20-inch: 125 PSI at 170 degrees F.


8. Joint: Steel flanges.

9. Accessories:

a. Galvanized aircraft-type cable or control rods to prevent over extension.


2.3 SEISMIC RESTRAINT DEVICES

A. Resilient Isolation Washers and Bushings: 1-piece, molded, bridge-bearing neoprene complying with AASHTO M 251 and having a durometer of 50, plus or minus 5, with a flat washer face.

B. Seismic Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings. Mason Type: Z-1011 or Z-1225. Snubber load rating to match equipment size.

1. Anchor bolts for attaching to concrete be seismic-rated, drill-in, and stud-wedge or female-wedge type.

2. Resilient Isolation Washers and Bushings: 1-piece, molded, bridge-bearing neoprene complying with AASHTO M 251 and having a durometer of 50, plus or minus 5.
C. Restraining Cables: Galvanized steel aircraft cables with end connections made of steel assemblies that swivel to final installation angle and utilize two clamping bolts for cable engagement. Mason Type: SCB.

D. Anchor Bolts: Seismic-rated, drill-in, and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488/E 488M.

2.4 FACTORY FINISHES

A. Provide manufacturer's standard prime-coat finish ready for field painting. Units mounted outdoors exposed to weather: Epoxy powder coated, with 1000 hour salt spray rating per ASTM B-117. For high levels of corrosion protection utilize:

1. Kynar 500 Fluoropolymer Coating:
   a. Conform to AAMA 605.2.
   b. Apply coating following cleaning and pretreatment.
   c. Cleaning: AA-C12C42R1X.
   d. Dry system before final finish application.
   e. Total Dry Film Thickness: Approximately 1.2 mils, when baked at 450 degrees F for 10 minutes.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.

2. Hardware be electrogalvanized. Hot-dip galvanize metal components for exterior use.

3. Baked enamel for metal components on isolators for interior use.

4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

2.5 SEISMIC-BRACING/RESTRAINT DEVICES/SYSTEMS FOR EQUIPMENT, PIPING, AND DUCTWORK

A. General Requirements for Restrainment Components: Rated strengths, features, and applications be as defined in reports by agency acceptable to authorities having jurisdiction.
B. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components be at least four times maximum seismic forces to which they will be subjected.

C. Anchor bolts for attaching to concrete to be seismic-rated, drill-in, and stud-wedge or female-wedge type.

D. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.

E. Maximum 1/4-inch air gap, and minimum 1/4-inch thick resilient cushion.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Vibration isolators and seismic restraint systems must be installed in strict accordance with manufacturer's written instructions and certified submittal data.

2. Set floor-mounted equipment with steel base rails on 4-inch-high concrete housekeeping pads. Extend pad 6-inches beyond footprint of equipment in each direction.

3. Do not install equipment or pipe which makes rigid contact with building slabs, beams, studs, walls, etc.

4. Anchor baseplate to floor or structure. Provide rubber grommets and washers to isolate bolt from base plate. Under no circumstances is isolation efficiency to be destroyed when bolting isolators to floor.

5. Building Penetrations: Isolate water piping and ductwork penetrating wall, ceilings, floors or shafts from structure by piping isolator or by 3/8-inch thick foamed rubber insulation. Install units flush with finished structure face, using
one for each side as required. Cut units to length if longer than structure thickness. Caulk around pipe or duct at equipment room wall.

6. Provide roof curbs, equipment supports, and roof penetrations. Work to maintain roof warranty. Coordinate location, size, structural connections/requirements and flashing prior to installation.

7. Install Type 6 horizontal thrust restraints at centerline of thrust, symmetrical on either side of equipment.

8. Vibration isolators must not cause change of position of equipment or piping which would stress piping connections or misalignment shafts or bearings. Isolated equipment is to be level and in proper alignment with connecting ducts and pipes.

3.3 VIBRATION ISOLATION EQUIPMENT INSTALLATION

A. Install isolation as indicated on drawings by type and location and where indicated below.

B. Equipment Vibration Isolation Schedule:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Size</th>
<th>Vibration Isolator Type</th>
<th>Minimum Deflection (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chillers/Heat Pumps: Reciprocating, Water or Air-Cooled</td>
<td>All</td>
<td>Type 4A or 4B, FC-3</td>
<td>2.5</td>
</tr>
<tr>
<td>Chillers/Heat Pumps: Centrifugal, Screw or Scroll, Water or Air-Cooled</td>
<td>All</td>
<td>Type 4A or 4B, FC-3</td>
<td>1.5</td>
</tr>
<tr>
<td>Cooling Towers</td>
<td>All</td>
<td>B-1, Type 4A, FC-3</td>
<td>3.5</td>
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<tr>
<td>Boilers</td>
<td>All</td>
<td>Type 1 or 2, FC-2</td>
<td>0.2</td>
</tr>
<tr>
<td>Base-Mounted Pumps</td>
<td>0 to 5 HP</td>
<td>B-1, Type 1, FC-3</td>
<td>0.2</td>
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<tr>
<td>Base-Mounted Pumps</td>
<td>7.5+ HP</td>
<td>B-2, Type 1, FC-3</td>
<td>1.5</td>
</tr>
<tr>
<td>Inline Pumps</td>
<td>All</td>
<td>Type 4A, 4B, 5B, or 5C, FC-2</td>
<td>1.5</td>
</tr>
<tr>
<td>Fan-coils, Unit Heaters, Fan-Powered Terminal Units</td>
<td>All</td>
<td>Type 5B, or 5C, FC-1,2</td>
<td>0.75</td>
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<tr>
<td>Condensing Units</td>
<td>0 to 4.5 tons</td>
<td>Type 1 or 2</td>
<td>0.02</td>
</tr>
<tr>
<td>Condensing Units</td>
<td>5+ tons</td>
<td>Type 4A</td>
<td>2.5</td>
</tr>
<tr>
<td>Rooftop Air Handlers, AC, Heat Pump Units</td>
<td>0 to 19.5 tons</td>
<td>RC-1, FC-1,2</td>
<td>0.75</td>
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<tr>
<td>Rooftop Air Handlers, AC, Heat Pump Units</td>
<td>20+ tons</td>
<td>RC-2, FC-1,2</td>
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<tr>
<td>Description</td>
<td>Diameter Range</td>
<td>Isolation Type</td>
<td>Load Factor</td>
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<td>---------------------------------------</td>
<td>------------------------</td>
<td>-------------------------------------</td>
<td>-------------</td>
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<tr>
<td>Axial, Cabinet, Centrifugal Inline</td>
<td>0 to 23.5-inch diameter</td>
<td>Type 3, 4A, 4B, 5B, or 5C, FC-1</td>
<td>0.75</td>
</tr>
<tr>
<td>Fans</td>
<td></td>
<td></td>
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<tr>
<td>Axial, Cabinet, Centrifugal Inline</td>
<td>24-inch+ diameter</td>
<td>Type 3, 4A, 4B, 5B, or 5C, FC-1</td>
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<tr>
<td>Fans</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Propeller Fans</td>
<td>All</td>
<td>Type 2 or Type 5A, FC-1</td>
<td>0.25</td>
</tr>
</tbody>
</table>

C. Isolation Mounts:

1. Install minimum of four seismic snubbers on isolated equipment. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.

2. Install resilient bolt isolation washers on equipment anchor bolts.

3. Provide flexible piping connection and flexible ductwork connection to equipment with isolation mounts or bases.

D. Isolating Hangers:

1. Support piping and ductwork connected to isolated equipment within equipment rooms on isolating hangers as scheduled on drawings. Unless otherwise noted, first three hangers from isolated equipment to have a minimum of 1/2 static deflection of equipment isolators. Other isolating hangers to have a minimum of 1/4 static deflection of equipment isolators.

2. Position isolating hanger elements as high as possible in hanger rod assembly, but not in contact with building structure. Install hangers so that hanger housing may rotate full 360 degrees about rod axis without contacting any object.

3. Unless otherwise noted, air supply units with internally isolated fans do not require isolating hangers for connecting pipes and ductwork.

4. Where parallel running pipes are hung together on an isolated trapeze, provide isolator deflections for largest determined by provisions for pipe isolation. Do not mix isolated and non-isolated pipes in same trapeze.

5. Install limit stops so they are out of contact during normal operation.

E. Equipment Bases:

1. Fill concrete inertia bases, after installing base frame, with 3000-PSI (20.7-MPa) concrete; trowel to a smooth finish.
2. Concrete Bases: Anchor equipment to concrete base according to supported equipment manufacturer's written instructions for seismic codes at Project site.

3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.

4. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base and anchor into structural concrete floor.

5. Place and secure anchorage devices. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

6. Install anchor bolts to elevations required for proper attachment to supported equipment.

7. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 SEISMIC RESTRAINTS

A. General:

1. Install and adjust seismic restraints so that equipment, piping, and ductwork supports are not degraded by restraints.

2. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.

3. Install restraining cables at each trapeze, individual pipe hanger and hanging vibration isolated equipment. Provide restraining cables in each of the four directions of movement. Install restraining cables no less than 45 Degrees from vertical. At trapeze anchor locations, shackle piping to trapeze. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.

4. Install steel angles or channel, sized to prevent buckling, clamped with ductile-iron clamps to hanger rods for trapeze and individual pipe hangers. At trapeze anchor locations, shackle piping to trapeze. Requirements apply equally to hanging equipment. Do not weld angles to rods.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform following field quality-control testing:

1. Isolator seismic-restraint clearance.
2. Isolator deflection.
3. Snubber minimum clearances.

3.6 ADJUSTING

A. Adjust isolators after piping systems have been filled and equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop.

D. Adjust active height of spring isolators.

E. Adjust snubbers according to manufacturer’s written recommendations.

F. Adjust seismic restraints to permit free movement of equipment within normal mode of operation.

G. Torque anchor bolts according to equipment manufacturer’s written recommendations to resist seismic forces.

3.7 CLEANING

A. After completing equipment installation, inspect vibration isolation and seismic-control devices. Remove paint splatters and other spots, dirt, and debris.

END OF SECTION
SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Type A, Flexible Fiberglass Blanket
   2. Type B, Duct Liner
   3. Type 1, Fiberglass Pipe Insulation
   4. Type 2, Flexible Elastomeric Insulation
   5. Jacketing
   6. Accessories
   7. Duct Insulation Accessories
   8. Duct Insulation Compounds

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:
   1. Piping and duct insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:
1. Installer qualifications.

2. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any) for each type of product indicated.

3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

4. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

5. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Installer to have minimum 5 years experience in the business of installing insulation.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.7 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a flame spread of 25, fuel contributed of 50 and smoke developed of 50 as tested by current edition of ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with the requirements of current edition of UL "Pipe and Equipment Coverings R5583 400 8.15."

C. Test duct insulation in accordance with current edition of ASTM E84, UL 723, NFPA 255, NFPA 90A and NFPA 90B.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Type A, Flexible Fiberglass Blanket:
   1. Certainteed
   2. Johns Manville
   3. Knauf
   4. Owens-Corning
   5. PPG
   6. Or approved equivalent.

B. Type B, Duct Liner:
   1. Certainteed
   2. Johns Manville
   3. Knauf
   4. Owens-Corning
   5. PPG
   6. Or approved equivalent.

C. Type 1, Fiberglass Pipe Insulation:
   1. Certainteed
   2. Johns Manville
   3. Knauf
   4. Owens-Corning
   5. PPG
   6. Or approved equivalent.

D. Type 2, Flexible Elastomeric Insulation:
1. Armacell LLC Armaflex.
2. Or approved equivalent.

2.2 TYPE A, FLEXIBLE FIBERGLASS BLANKET
A. ASTM C553, Type 1, Class B-2; flexible blanket.
B. 'K' Value: 0.27 BTU*in/(hr*sf*F) at 75 degrees F installed, maximum service temperature: 250 degrees F.
C. Density: 0.75 pounds per cubic foot.
D. Vapor Barrier Jacket: FSK aluminum foil reinforced with fiberglass yarn and laminated to fire resistant Kraft, secured with UL listed pressure sensitive tape or outward clinched expanded staples and vapor barrier mastic as needed.

2.3 TYPE B, DUCT LINER
A. ASTM C1071; flexible blanket.
B. 'K' Value: ASTM C518, 0.25 BTU*in/(hr*sf*F) at 75 degrees F, maximum service temperature: 250 degrees F.
C. Noise Reduction Coefficient: 0.65 or higher based on "Type A mounting."
D. Maximum Velocity on Mat or Coated Air Side: 5,000 FPM.
E. Adhesive: UL listed waterproof type.
F. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.
H. ASTM G21 and ASTM G22 Microbial Growth Resistance.

2.4 TYPE 1, FIBERGLASS PIPE INSULATION
A. Glass Fiber: ASTM C547; rigid molded, noncombustible.
   1. Thermal Conductivity Value: 0.27 BTU-Inch (hour/sf/deg F) at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
3. Vapor Retarder Jacket: White Kraft paper reinforced with glass fiber and bonded to aluminum foil, secure with self-sealing longitudinal laps and butt strips or vapor barrier mastic.

2.5 TYPE 2, FLEXIBLE ELASTOMERIC INSULATION

A. Elastomeric Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

1. Thermal Conductivity Value: 0.25 BTU*in/(hr*sf*F) at 75 degrees F.

2. Maximum Service Temperature of 220 degrees F.


4. Maximum Smoke Developed: 50 (1-inch thick and below).

5. Connection: Waterproof vapor retarder adhesive as needed.

6. UV Protection: UV outdoor protective coating per manufacturers requirements.

B. Glue: Contact adhesive specifically manufactured for cementing flexible elastomeric foam. Armacell LLC Armaflex Low VOC adhesive, Halstead, or approved equivalent.

C. Paint: Nonhardening high elasticity type, specifically manufactured as protective covering of flexible elastomeric foam insulation for prevention of degradation due to exposure to sunlight and weather. Armacell LLC Armaflex, Halstead, or approved equivalent.

2.6 JACKETING

A. Canvas Jacket: UL listed fabric, 6 ounce/sq. yd., plain weave cotton treated with dilute fire retardant lagging adhesive.

B. PVC preformed molded insulation covers. Zeston or approved equivalent.

C. Aluminum Jacket: 0.016-inch-thick sheet, (smooth/embossed) finish, with longitudinal slip joints and 2-inch laps, die-shaped fitting covers with factory attached protective liner.

D. Stainless Steel Jacket: Type 304 stainless steel, 0.010-inch, smooth finish.

2.7 ACCESSORIES

A. Equipment Insulation Jacketing: Presized glass cloth, not less than 7.8 ounces/sq.yd., except as otherwise indicated. Coat with gypsum based cement.
B. Equipment Insulation Compounds: Provide adhesives, cement, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

C. General: Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated. Accessories, i.e., adhesives, mastics, cements and tape to have the same flame and smoke component ratings as the insulation materials with which they are used. Shipping cartons to bear a label indicating that flame and smoke ratings do not exceed those listed above. Provide permanent treatment of jackets or facings to impart flame and smoke safety. Provide nonwater soluble treatments. Provide UV protection recommended by manufacturer for outdoor installation.

2.8 DUCT INSULATION ACCESSORIES

A. Staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.

2.9 DUCT INSULATION COMPOUNDS

A. Cements, adhesives, coatings, sealers, protective finishes and similar accessories as recommended by insulation manufacturer for applications indicated. Comply with South Coast Air Quality Management District (SCAQMD) Rule #1168 in accordance with LEED EQ 4.1.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Do not apply insulation until pressure testing of the ducts and piping has been completed. Do not apply to pipe with heat tracing until system has been tested. Do not apply insulation until the duct has been inspected.

B. Examine areas and conditions under which duct and pipe insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to be insulated.

3.3 INSTALLATION

A. Insulation: Continuous through walls, floors, partitions except where noted otherwise.

B. Piping and Equipment:
1. Install insulation over clean, dry surfaces with adjoining Sections firmly butted together and covering surfaces. Fill voids and holes. Seal raw edges. Install insulation in a manner such that insulation may be split, removed, and reinstalled with vapor barrier tape on strainer caps and unions. Do not install insulation until piping has been leak tested and has passed such tests. Do not insulate manholes, equipment manufacturer's nameplates, handholes, and ASME stamps. Provide beveled edge at such insulation interruptions. Repair voids or tears.

C. Ductwork:

1. Install insulation in conformance with manufacturer's recommendations to completely cover duct.

2. Butt insulation joints firmly together and install jackets and tapes smoothly and securely.

3. Apply duct insulation continuously through sleeves and prepared openings, except as otherwise specified. Apply vapor barrier materials to form complete unbroken vapor seal over insulation.

4. Coat staples and seals with vapor barrier coating.

5. Cover breaks in jacket materials with patches of same material as vapor barrier. Extend patches not less than 2-inches beyond break or penetration on all directions and secure with adhesive and staples. Seal staples and joints with vapor barrier coating.

6. Fill jacket penetrations. i.e., hangers, thermometers and damper operating rods, and other voids in insulation with vapor barrier coating. Seal penetration with vapor barrier coating. Insulate Hangers and Supports for cold duct in un-conditioned spaces to extent to prevent condensation on surfaces.

7. Seal and flash insulation terminations and pin punctures with reinforced vapor barrier coating.

8. Continue insulation at fire dampers and fire/smoke dampers up to and including those portions of damper frame visible at outside of the rated fire barrier. Insulating terminations at fire dampers in accordance with this Section.

9. Do not conceal duct access doors with insulation. Install insulation terminations at access door in accordance with this Section.

10. Duct Liners: Mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with continuous (minimum 90) percent coat of adhesive. For widths over 20-inches, additionally secure liner with mechanical fasteners.
15-inches on center or per manufacturer requirements. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation overlap sides. Factory/field coat exposed edges. Metal nosing for exposed lending edges and when velocity exceeds 3500 FPM or manufacturer rating on exposed edges. Keep duct liner clean and free from dust. At completion of project, vacuum duct liner if it is dirty or dusty. Cut studs off near washers. Do not use small pieces. If insulation is installed without horizontal, longitudinal, and end joints butted together, installation will be rejected and work removed and replaced with work that conforms to this Specification.

11. Duct Wrap: Cover air ducts per insulation table except ducts internally lined where internal duct lining is adequate to achieve adequate insulating values to meet local Energy Codes (indicate on shop drawings, locations where duct wrap is planned to be omitted and indicate internal duct lining insulating values to confirm they will meet the Energy Code.) Wrap tightly with circumferential joints butted and longitudinal joints overlapped minimum of 2-inches. Adhere insulation with 4-inch strips of insulating bending adhesive at 8-inches on center. On ducts over 24-inches wide, additionally secure insulation with suitable mechanical fasteners at 18-inches on center. Circumferential and longitudinal joints stapled with flare staples 6-inches on center and covered with 3-inch wide, foil reinforced tape.

3.4 PROTECTION AND REPLACEMENT

A. Installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

3.5 FIBERGLASS INSULATION

A. Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate the vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.

B. Apply insulation to pipe and seal with self-sealing lap. Use self-sealing butt strips to seal butt joints. Insulate fittings, valves and unions with single or multiple layers of insulation and cover to match pipe or use performed PVC molded insulation covers.

3.6 LABELING AND MARKING

A. Provide labels, arrows and color on piping and ductwork. Attach labels and flow direction arrows to the jacketing per Section 23 05 53, Identification for HVAC Piping, Ductwork and Equipment.
### PIPING SURFACES TO BE INSULATED

<table>
<thead>
<tr>
<th>Item to be Insulated</th>
<th>System Insulation Type</th>
<th>Pipe Size</th>
<th>Insulation Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating, Steam, and Steam Condensate (201°F to 250°F)</td>
<td>1</td>
<td>Runouts up to 2-inch</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>&lt;=1-inch</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;1-inch and &lt;=2-inch</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;2-inch and &lt;=4-inch</td>
<td>2-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;4-inch and &lt;=6-inch</td>
<td>2-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;6-inch</td>
<td>3-1/2-inch</td>
</tr>
<tr>
<td>Heating, Steam, and Steam Condensate (141°F to 200°F)</td>
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<td>Runouts up to 2-inch</td>
<td>1/2-inch</td>
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<td>1-1/2-inch</td>
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<td>1-1/2-inch</td>
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<td></td>
<td></td>
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<td>1-1/2-inch</td>
</tr>
<tr>
<td>Heating, Steam and Steam Condensate (105°F to 140°F)</td>
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<td>Runouts up to 2-inch</td>
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<tr>
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<tr>
<td></td>
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<td>&gt;2-inch and &lt;=4-inch</td>
<td>1-inch</td>
</tr>
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<td>1-inch</td>
</tr>
<tr>
<td>Chilled Water</td>
<td>1/inch</td>
<td>&lt;=1-inch</td>
<td>1-inch</td>
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<tr>
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</tr>
<tr>
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<td>&gt;6-inch</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td>Refrigerant Suction Piping</td>
<td>2</td>
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<td>1/2-inch</td>
</tr>
<tr>
<td>(40F to 60F)</td>
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<td>&lt;=1-inch</td>
<td>1/2-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;1-inch and &lt;=2-inch</td>
<td>1/2-inch</td>
</tr>
<tr>
<td></td>
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<td>&gt;4-inch and &lt;=6-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;6-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td>Refrigerant Suction Piping</td>
<td>2</td>
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<td>1-inch</td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
<td>&gt;6-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>
### Chilled and Heating Water Storage Tanks
- 2, N/A, 2-inch
- Air Separation Tanks: 2, N/A, 2-inch
- Heat Exchangers (Steam): 2, N/A, 3-1/2-inch
- Heat Exchangers (Hydronic): 2, N/A, 2-inch

**A.** Note: Insulation thickness shown is a minimum. If state code requires additional thickness, then provide insulation thickness per code requirements.

### 3.8 DUCTWORK SURFACES TO BE INSULATED

<table>
<thead>
<tr>
<th>Item to be Insulated</th>
<th>System Insulation Type</th>
<th>Duct Size</th>
<th>Insulation Thickness</th>
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</thead>
<tbody>
<tr>
<td>Supply ductwork where duct is not specified to be lined.</td>
<td>A</td>
<td>All</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td>Return ductwork where duct is not specified to be lined or where ductboard is not utilized.</td>
<td>--</td>
<td>All</td>
<td>None</td>
</tr>
<tr>
<td>Supply ductwork (exposed to weather, in crawl space and in unheated attics)</td>
<td>A</td>
<td>All</td>
<td>3-inch</td>
</tr>
<tr>
<td>Return ductwork (exposed to weather, in crawl space and in unheated attics)</td>
<td>A</td>
<td>All</td>
<td>3-inch</td>
</tr>
<tr>
<td>Outside Air Ducts</td>
<td>A</td>
<td>All</td>
<td>3-inch</td>
</tr>
<tr>
<td>HVAC plenums and unit housings not preinsulated</td>
<td>B</td>
<td>All</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td>Exhaust ducts within 10-feet of exterior</td>
<td>A</td>
<td>All</td>
<td>3-inch</td>
</tr>
</tbody>
</table>

**A.** Note: Insulation thickness shown is a minimum. If state codes require additional thickness, then provide insulation thickness per code requirements.
3.9 INSULATED PIPE EXPOSED TO WEATHER

A. Where piping is exposed to weather, cover insulation with aluminum jacket. Seal watertight jacket per manufacturer's recommendations. Install metal jacket with 2-inch overlap at longitudinal and butt joints with exposed lap pointing down. Secure jacket with stainless-steel draw bands 12-inches on center and at butt joints. Provide heat tracing on piping subject to freezing.

3.10 FLEXIBLE ELASTOMERIC PLASTIC PIPE INSULATION

A. Slip insulation on pipe prior to connection. Butt joints sealed with manufacturer's adhesive. Insulate fitting with miter-cut pieces. Cover insulation exposed to weather and underground with two coats of finish as recommended by manufacturer.

3.11 FLEXIBLE ELASTOMERIC TUBING

A. Flexible Elastomeric Tubing: Slip insulation over piping or, if piping is already installed, slit insulation and snap over piping. Joints and butt ends must be adhered with 520 adhesive.

3.12 INSULATION SHIELDS

A. Provide hangers and shields (18 gauge minimum) outside of insulation for cold piping (<60 degrees F). Hot water piping hangers may penetrate insulation to contact pipe directly. Provide 18-inch long, noncompressible insulation Section at insulation shields for lines 2-inches and larger for steam and chilled water piping.

3.13 STORAGE TANKS

A. Finish with canvas jacket and adhesive. Overlap joints minimum of 4-inches. Apply two coats latex paint; color selected by Architect.

3.14 PROTECTION AND REPLACEMENT

A. Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

END OF SECTION
SECTION 23 11 23

FACILITY FUEL - NATURAL GAS PIPING AND SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Fuel Pipe and Pipe Fittings
   2. Natural Gas Valves

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:
   1. Division 26, Electrical requirements for grounding fuel piping systems.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements apply to this Section.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Natural Gas Valves:
   1. Apollo
   2. Jenkins Bros.
   3. Lunkenheimer Co.
   4. Nibco
   5. Watts
   6. Or approved equivalent.

2.2 FUEL PIPE AND PIPE FITTINGS

A. Steel Pipe (Above Grade Installation):
   1. 2-inches and Smaller: Schedule 40, A53 black steel pipe and threaded black maleable threaded fittings.
   2. 2-1/2-inches and Larger: Schedule 40, A53 black pipe with Schedule 40 butt weld fittings.
   3. ASTM A53, electric-resistance welded Type E Grade B, black, Schedule 40 pipe, manufactured for welded pipe connections.

B. Fittings for Steel Pipe (Above Grade Installations):
   1. General: Mark fittings, unions, and other products recognized as regularly available products in accordance with MSS SP-25. Marking on products of small size or shape may be omitted from sequence allowed by MSS SP-25, except for manufacturer’s name or trademark.
   2. Threaded Fittings: Conforming to ANSI B2.1, ASTM A47, 150 PSI rating, except where otherwise specified or prevailing codes or requirements dictate use of 300 PSI ratings. Fittings to be fabricated from standard maleable iron with dimensions conforming to ANSI B16.3.
4. Flanges: Carbon steel conforming to ASTM A105, ANSI B16.5, and factory forged in USA. Flanges which have been machined, remade, painted, or are non-domestic origin are not acceptable. Provide raised or full face ends wherever indicated or required.

5. Flange Gaskets: Gaskets to be constructed from Buna-N (Nitrile), NBR, or Viton elastomeric materials.

6. Flange Hardware: Bolting materials to be corrosion resistant carbon steel bolts and hex nuts conforming to ASTM A307. Provide bolting materials used in containment sumps below grade applications, stainless steel bolts and hex nuts conforming to ASTM A453. Threads and dimensions to be in accordance with ANSI B1.1 and B18.2.

7. Unions: Conform to ANSI B16.39, ASTM A47 and fabricated from malleable iron with bronze-to-iron ground joints rated at 150 percent design operating pressure. Threads to conform to ANSI B2.1.


C. Steel Pipe (Exterior of Building Below grade Installations):

1. 2-inches and Smaller: Schedule 40, A53 black steel pipe and threaded black malleable threaded fittings.

2. 2-1/2-inches and Larger: Schedule 40, A53 black pipe with butt weld fittings.

3. ASTM A53, electric-resistance welded (Type E) or seamless (Type S), Grade B, black, Schedule 40 pipe, manufactured for threaded, or welded pipe connections.

D. Fittings for Steel Pipe (Exterior of Building Below grade Installations):

1. General: Mark fittings and other products recognized as regularly available products in accordance with MSS SP-25. Marking on products of small size or shape may be omitted from sequence allowed by MSS SP-25, except for manufacturer's name or trademark.

2. Threaded Fittings: Conforming to ANSI B2.1, ASTM A47, 150 PSI rating, except where otherwise specified, or prevailing codes or requirements dictate use of 300 PSI ratings. Fittings fabricated from standard malleable iron with dimensions conforming to ANSI B16.3.
3. **Welded Fittings:** Wrought carbon steel fittings, ASTM A234, ANSI B16.9, B16.28. Butt-welding type unless otherwise indicated to be socket welding type.


5. **Thread Lubricant:** Meet or exceed CGA ratings and compliant with Federal Specification TT-S-1732, manufactured compatible with fuel oil.

**E. Corrosion Control:**

1. **Underground Steel Piping Corrosion Protection:** Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat." Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3-inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.

2. **1/2-inch and Larger:** Schedule 40, A53 black pipe with butt weld fittings.

**F. Corrugated Stainless Steel Tubing (CSST) (Above Grade Installations):** 3/8- to 1-inch ID sizes only.

1. **Tubing:** Corrugated stainless steel tubing manufactured of Type 304 stainless steel with yellow polyethylene jacketing and complying with ANSI/CSA LC-1 Standards.

2. **Fittings:** Brass mechanical type fittings utilizing a retainer ring, slide ring, silicone O-ring and high temperature sealing gasket.

3. **Termination Plates and Brackets:** Provide premanufactured termination plates and brackets of same manufacturer as pipe (CSST).

4. **Valves:** Ball valves, brass mechanical type utilizing retainer rings, slide rings, silicone O-rings and high temperature sealing gasket. Comply with ANSI/ASME B16.33.

5. **Manifolds:** Field fabricated Schedule 40, A53 black steel pipe nipples and black malleable threaded fittings.

6. **Manufacturer:** Tru-Flex, Pro-Flex, Gastite, or approved equivalent.

**G. CSST (Below grade Interior of Building Installation):**
1. Underground piping will consist of CSST sleeved with black integral polyethylene sleeve. External polyethylene sleeve will be rated to withstand superimposed loads. Sleeve will allow for internal venting of interstice and run longitudinally along primary piping to terminal fittings. Fittings will form gas tight seal and be provided with a vent port to provide venting as required.

2. Piping/sleeve is to be continuous with no joints or fittings below grade. Vented sleeve is to be continuous with jointed fittings (above grade) to combine sleeves from independent piping runs. External jacket (sleeve) is to be vented to atmosphere at exterior of building, location as required by Code and AHJ.

3. Tubing is to be Type 300 stainless steel conforming to ASTM A240 sleeved with black integral fire retardant polyethylene sleeve. Tubing is to be suitable for operation with Natural Gas and LP gas (Propane). Polyethylene jacketing is to meet ASTM E-84 for flame and smoke ratings.

4. Fittings to be brass or stainless steel.

5. Manufacturers: TracPipe PS-II or approved equivalent.

H. Polyethylene Pipe (Below grade Exterior of Building Installations at 30 PSIG and Less Only):

1. General: Polyethylene pipe, tubing and fittings conform to applicable provisions and requirements of latest revision of the US Department of Transportation Pipeline Safety Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards," and appropriate standards referenced in those documents.

2. Materials:
   a. Polyethylene compounds: grade of PE24 or PE34, and minimum cell classification of PE213363 or PE334464, as defined in ASTM D3350. In conformance with ASTM D2513, PPI recommended hydrostatic design basis (HDB) of 1250 PSI (PE2406) at 73.4F (23C). HDB in accordance with ASTM D2837.
   b. When any plastic material is used for transportation of liquefied petroleum gas (LPG), it must qualify for use through testing with LPG as the test medium, and have a hydrostatic design basis category of at least 1,000 PSI (6.9 MPa) at 73.4F (23C), as determined by ASTM D2837. Materials that qualify for natural gas service and that carry a recommended HDB at 140F in accordance with ASTM D2513 also qualify for LPG service without the need for further testing.
c. Clean rework material of same type and grade, generated from manufacturer's own pipe and fitting production, may be used by same manufacturer as long as pipe, tubing or fitting produced meet requirements of ASTM D2513.

3. Pipe and Tubing: Manufacture pipe and tubing furnished under this specification using compounds complying with the requirements of Section 2, above, and appropriate requirements of Part 192 of the Minimum Federal Safety Standards. Dimensional characteristics (including outside diameter, wall thickness, toe-in, ovality and length) and performance characteristics (including chemical resistance, sustained pressure, elevated temperature service, burst pressure/apparent tensile strength, joining, squeeze-off and outdoor storage stability) conforms to requirements of ASTM 02513 including applicable annexes. Pipe and tubing may be supplied in either coils or straight lengths.

1. Polyethylene Pipe Fittings (Below grade Exterior of Building Installations at 30 PSIG and Less Only):

1. Fittings: Manufacture polyethylene fittings furnished under this specification using compounds complying with requirements of Paragraph B, above, and appropriate requirements of Part 192 of the Minimum Federal Safety Standards. Socket type fittings comply with ASTM 02683. Butt fusion fittings to comply with ASTM 03261. Electrofusion fittings comply with ASTM F1055. Plastic mechanical fittings comply with ASTM F1924. Mechanical fittings produced from metallic or materials other than plastics listed in Paragraph B be approved only after submission of appropriate test data and service histories indicating their acceptability for the intended service. In addition, categorize mechanical fittings for pullout resistance as stated in ASTM 02513 and identified as to appropriate category. Plastic valves meets requirements of ANSI Standard B16.40. Specifications and requirements for fittings supplied complies with appropriate Sections of Part 192 of the Minimum Federal Safety Standards or NFPA 58 LP Gas Code.

a. ASTM D2683, socket-type polyethylene fittings
b. ASTM D3261, butt-fusion polyethylene fittings
c. ASTM F1055, electro-fusion polyethylene fittings
d. ASTM F1924, mechanical push-on fittings for polyethylene pipe

2. Anodeless Epoxy Coated Steel Riser Assembly: Provide an anodeless riser assembly to terminate underground polyethylene piping either above grade or inside a concrete vault.
a. Provide a riser casing for corrosion protection at each riser assembly. Casing will manufactured from ASTM A53, Schedule 40 steel pipe, ASTM A513 ER steel pipe (minimum 0.073-inch pipe wall), or flexible metallic tubing with a minimum crush strength of 1000 PSIG and a tensile strength of 300 PSIG including transition connection as tested by manufacturer.

1) Horizontal portion of riser assembly will be installed with minimum 12-inches of compacted cover.

2) Factory-assembled riser assemblies will be sealed and leak tested by the manufacturer.

3) Field-assembled riser assemblies will be accepted when supplied in kit form with necessary hardware for the riser installation. Field-assembled riser assemblies will be provided compliant with following requirements:
   a) They are design certified.
   b) They are sealed and pressure tested by installer.
   c) They are assembled and installed in accordance with manufacturer's instructions.

b. Manufacturer: ERS, Inc. or approved equivalent.

3. Flexible Connectors: Flexible connectors used in LP and LPG piping systems compliant with following:

   a. Install in accordance with manufacturer's instructions.

   b. Flexible connectors and hose used as flexible connectors not exceed 3-feet in length where used with liquid or vapor piping on portable or stationary tanks.

   c. Hose permitted to be used if flexibility is required for liquid or vapor transfer.

4. Marking:

   a. Mark pipe and tubing in accordance with ASTM 02513. Marking: legible and remain legible under normal handling and installation practices. Indent marking may be utilized provided (1) marking does not reduce wall thickness to less than minimum value for pipe or tubing, (2) it has been demonstrated that these marks have no effect on
long-term strength of pipe or tubing, and (3) marking will not provide leakage channels when approved elastomeric gasket compression fittings are used to make joints.

b. Mark fusion fittings on body or hub. Marking in accordance with ASTM 02513 or standard to which fitting is manufactured. Mark mechanical fittings in accordance with fitting standard to which it is manufactured or Part 192 of Minimum Federal Safety Standard Section 192.63.

5. Fusion Qualification: Manufacturer of pipe, tubing, or fittings supplied under this Specification to establish and certify heat fusion procedures for joining of materials supplied in accordance with applicable Section of (CFR) Title 49, Part 192 "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards," paragraph 192.283. Furnish qualified fusion procedures, with appropriate supporting data, to purchaser upon request. Suitable generic fusion procedures are included in PPI TR-33, Generic Butt Fusion Joining Procedure for Polyethylene (PE) Gas Pipe.

2.3 NATURAL GAS VALVES

A. 2-inches and Smaller: MSS SP-110 ball valves constructed in compliance with ASME B16.33. UL listed, FM approved, two-piece construction, threaded, bronze or brass body, full port, chrome plated brass ball, blowout-proof stem design, 125 PSI WOG working pressure. Watts FBV-3C, Nibco FP-600A, Apollo 64, or Jenkins 201J.

B. 2-1/2-inches and Larger: 100 to 125 PSI rated, all bronze or iron body/bronze trimmed plug cock type, square head or tee/lever handle operation. CSA listed.

C. Manufacturers: Apollo, Jenkins Bros., Lunkenheimer Co. Div. of Conval Corp., Nibco, Watts, or approved equivalent.

PART 3 - EXECUTION

3.1 INSPECTION

A. General: Examine areas and conditions under which fuel systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 IDENTIFICATION

A. Install mechanical identification in accordance with Section 23 05 53, Identification for HVAC Piping and Equipment.
3.3 FUEL PIPING INSTALLATION

A. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each route with a minimum of joints and couplings, but with adequate and accessible unions or flanges for disassembly, maintenance, and replacement of valves and equipment. Reduce sizes by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance. Comply with ANSI B31.9 Code for Pressure Piping. Provide shutoff valves, pressure regulators and unions at connections to gas-fired equipment. Provide dirt legs at low points.

B. Installed piping not to interfere with maintenance of equipment, opening of doors or other moving parts nor be directly above or near any portion of electrical equipment.

C. Support piping such that connected equipment does not bear weight of piping.

D. Adequately support vertical lines at their bases or by suitable hanger placed in horizontal line near riser or, preferably, by base fitting set on a pedestal.

E. Piping Through Roof: Coordinate roof penetrations prior to installation of piping. Coordinate location with roof structure and roof mounted equipment.

F. Ream steel pipes after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods for opening and closure.

G. Remake or replace defective, leaking, or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

H. Threading: Thread steel pipe in accordance with ANSI B21.1 with standard right hand threads. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or proper pipe joint tape where recommended by pipe/fitting manufacturer on male threads at each joint and tighten joint to leave not more than three threads exposed.

I. Sealants: Use sealants on metal fuel piping threads which are chemically resistant to fuel. Use sealants sparingly and apply only to male threads of metal joints.

J. Maintain electrically continuous piping system; provide grounding jumper where required to maintain continuity. Provide grounding connection; install per requirements of Division 26, Electrical.

K. Install dirt legs in gas piping where indicated and where required by code or regulation. Do not rest dirt leg on surface of roof, floor or deck.
L. Support gas piping above roof on preformed pipe stands. Guide pipes with clamp one size larger than pipe. Provide supports at intervals per code manufacturer, and details and at each change in direction. Wood blocks are not approved supports.

M. Gas Regulator Vent Piping: Provide Schedule 40, A53 black steel pipe and threaded black malleable threaded fittings for vent piping. Paint piping exposed to weather with primer and one coat of Safety Yellow Rustoleum.

N. Piping: Paint piping exposed to weather with primer and one coat of Safety Yellow Rustoleum.

3.4 INSTALLATION OF VALVES

A. Gas Cocks: Provide at connection to gas train for each gas-fired equipment item, and on risers and branches where indicated.

B. Locate gas valves where easily accessible and protected from possible damage.

3.5 EQUIPMENT CONNECTIONS

A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer’s instructions. Flexible connections where required per ASCE 7-10 or shown on Drawings.

3.6 PIPING TESTS

A. Test natural gas piping in accordance with applicable mechanical code requirements, ANSI B31.2, and local utility requirements.

END OF SECTION
SECTION 23 21 13
HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:

1. Heating Water Piping, Above Ground
2. Chilled Water Piping, Above Grade
3. Condenser Water Piping, Above Ground
4. Equipment Drains and Overflows
5. Unions
6. Refrigerant Piping

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Welding Certificates: Copies of certificates for welding procedures and personnel.

2. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
   a. Test procedures used.
b. Test results that comply with requirements.

c. Failed test results and corrective action taken to achieve requirements.

3. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at project site.

4. Buried piping manufacturer to submit thrust block (chilled water) and anchor plate (heating hot water) layout and details including anchorage and seismic calculations.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Installer Qualifications: Company specializing in performing work of the type specified in this Section, with documented experience.

2. Welder Qualifications: Certify in accordance with ASME (BPV IX).

3. ASME Compliance: Comply with ASME B31.9 "Building Services Piping" for materials, products, and installation. Provide safety valves and pressure vessels with the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.

4. Refrigerant Piping:

a. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX "Welding and Brazing Qualifications."


c. ASME Standard: comply with ASME B31.5, "Refrigeration Piping."

d. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical" or UL 429 "Electrically Operated Valves."
1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. As specified in Articles below.

B. Or approved equivalent.

2.2 HEATING WATER PIPING, ABOVE GROUND

A. Steel Pipe: ASTM A53/A 53M, Schedule 40, black, Type E (electric resistance welded), Grade B.


2. Wrought Cast and Forged Steel Flanges and Flanged Fittings: ASME B16.5 including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   b. End Connections: Butt welding.
   c. Facings: Raised face.

3. Joints: Threaded or AWS D1.1 welded.

B. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), drawn.


2. Joints: Solder, lead free ASTM B32, HB alloy (95-5 tin antimony), or tin and silver.

3. Joints: Brazed, AWS A5.8, Classification BAg-1 (silver). Pipes 2-1/2-inches or larger or piping routed over food preparation centers, food serving facilities, food storage areas, computer rooms, telecommunications rooms, and electrical rooms.
2.3 CHILLED WATER PIPING, ABOVE GRADE

A. Manufacturers - Grooved Mechanical Joint Fittings and Couplings:

1. Central Sprinkler Company; Central Grooved Piping Products
2. Anvil International
3. Victaulic Company of America
4. Shurjoint Piping Products
5. Or approved equivalent.

B. Steel Pipe: ASTM A 53/A 53M, Schedule 40, black, Type E (electric resistance welded), Grade B.


2. Wrought Cast and Forged Steel Flanges and Flanged Fittings: ASME B16.5 including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   b. End Connections: Butt welding.
   c. Facings: Raised face.

3. Joints: Threaded or AWS D1.1 welded.

C. Copper Tube: ASTM B 88 (ASTM B 88M), Type K (A), hard drawn.


2. Joints: Solder, lead free ASTM B32, HB alloy (95-5 tin antimony), or tin and silver.

3. Joints: Brazed, AWS A5.8, Classification BAg-1 (silver). (Pipes 2-1/2-inches or larger or piping routed over food preparation centers, food serving facilities, food storage areas, computer rooms, telecommunications rooms, or electrical rooms.
2.4 CONDENSER WATER PIPING, ABOVE GROUND

A. Grooved Mechanical Joint Fittings and Couplings - Approved Manufacturers:
   1. Tyco Grooved Piping Products
   2. Grinnell Corporation
   3. Victaulic Company of America
   4. Shurjoint Piping Products
   5. Or approved equivalent.

B. Steel Pipe: ASTM A53/A 53M, Schedule 40, black, Type E (electric resistance welded), Grade B.
   2. Wrought Cast and Forged Steel Flanges and Flanged Fittings: ASME B16.5 including bolts, nuts, and gaskets of the following material group, end connections, and facings:
      b. End Connections: Butt welding.
      c. Facings: Raised face.
   3. Joints: Threaded or AWS D1.1 welded.

2.5 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), drawn.
   1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
   2. Joints: Solder, lead free, ASTM B 32, HB alloy (95-5 tin-antimony), or tin and silver.
   3. Joints: Brazed, AWS A5.8, Classification BAg-1 (silver). Pipes 2-1/2-inch or larger or piping routed over food preparation centers, food serving facilities, food storage areas, computer rooms, telecommunications rooms, and electrical rooms.
2.6 UNIONS

A. Unions for Pipe 2-inches and Under:
   2. Copper Pipe: Bronze, soldered joints, ASME B16.22.

B. Dielectric Connections: Provide dielectric waterway or brass nipple fitting with threaded ends. Dielectric unions are not allowed.

2.7 REFRIGERANT PIPING

A. Piping:
   1. Copper Tube: ASTM B 280, Type ACR, drawn-temper tube, clean, dry and capped.

B. Valves:
   1. Manufacturers:
      b. Henry Technologies.
      c. Danfoss Flomatic.
      d. Substitutions: See Section 23 00 00, HVAC Basic Requirements, Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
   2. Packaged Ball Valves:
a. Two piece bolted forged brass body with Teflon ball seals and copper tube extensions, brass seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of and maximum temperature of 300 degrees F.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 BURIED PIPING INSTALLATION

A. Install in accordance with Drawings, specifications, and manufacturer's installation instructions. Provide a field service instructor on site to train the Contractor in all phases of installation.

B. Underground Systems: Buried in a trench of not less than 2-feet deeper than the top of the pipe and not less than 18-inches wider than the combined O.D. of all piping systems. A minimum thickness of 24-inches of compacted backfill over the top of the pipe is required. System installation must meet H-20 highway loading.

C. Trench bottom to have a minimum of 6-inch of sand, pea gravel, or specified backfill material, as approved by the engineer, as a cushion for the piping. Field cutting of the pipe performed in accordance with the manufacturer's installation instructions.

D. Provide thrust blocking, anchor plates, and concrete.

E. Cast a concrete block over anchor plates as recommended by manufacturer. Block to sit on undisturbed trench sidewalls and/or the bottom of the trench. Concrete block to be at least the length as recommended by manufacturer and extend a minimum distance as recommended by manufacturer beyond the top and bottom of anchor plate.

F. Pressure test buried piping per Field Quality Control article below.

G. Field Service: Provided by a certified manufacturer's representative or company field service technician. The technician will be available at the job to check unloading, storing, and handling of pipe, joint installation, pressure testing and backfilling techniques.
H. Provide identification and tracer wire.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install heating water, glycol, condenser water, piping to ASME B31.9 requirements. Install chilled water piping to ASME B31.5 requirements.

C. PVC Pipe: Make solvent-welded joints in accordance with ASTM D 2855.

D. Route piping in orderly manner, parallel to building structure, and maintain gradient.

E. Install piping to conserve building space and to avoid interference with use of space.

F. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

G. Sleeve pipe passing through partitions, walls and floors allowing adequate space for pipe insulation.

H. Slope piping at 0.2 percent upward in direction of flow and arrange to drain at low points.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

K. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

L. Anchor piping for proper direction of expansion and contraction.

M. Inserts:

1. Provide inserts for placement in concrete formwork.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

3. Provide hooked rod to concrete reinforcement Section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

N. Pipe Hangers and Supports:

1. Install in accordance with Division 23, HVAC, Hangers and Supports.

2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.

3. Place hangers within 12-inches of each horizontal elbow.

4. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.


6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

7. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.

8. Provide copper plated hangers and supports for copper piping.

9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

O. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

P. Provide access where valves and fittings are not exposed.

Q. Use eccentric reducers to maintain top of pipe level.

R. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

S. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.

T. Refrigerant Piping:
1. Install systems in accordance with ASHRAE Standard 15.

2. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

3. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

4. Flood piping system with nitrogen when brazing.

5. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

6. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

7. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

8. Fully charge completed system with refrigerant after testing.

3.4 FIELD QUALITY CONTROL

A. Leave joints, including welds, uninsulated and exposed for examination during test.

B. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

C. Flush system with clean water. Clean strainers.

D. Isolate equipment from piping. If a valve is used to isolate equipment, provide closure capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

E. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

F. Perform the following tests on hydronic piping:

   1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release trapped air. Use drains installed at low points for complete draining of liquid.

3. Check expansion tanks to determine that they are not air bound and that system is full of water.

4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure not-to-exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."

5. After hydrostatic test pressure has been applied for at least four hours, examine piping, joints and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

6. Prepare written report of testing.

G. Refrigerant Piping:

1. Test refrigeration system in accordance with ASME B31.5.

2. Pressure test system with dry nitrogen to 200 PSI. Perform final tests at 27-inches vacuum and 200 PSI using electronic leak detector. Test to no leakage.

3.5 FLUSHING AND CLEANING OF PIPING SYSTEMS

A. Clean piping systems thoroughly. Purge pipe of construction debris and contamination before placing the piping systems in service. Provide temporary connections for cleaning, purging, and circulating fluids through the piping system.

B. Use temporary strainers and temporary pumps that can create fluid velocities up to 10 feet per second to flush and clean the piping systems. Do not use Owner's permanent strainers to trap debris during pipe flushing operations. Fit the temporary construction strainers with a line size blowoff valve.

C. When constructing minor piping modifications or additions, verify with Owner if the Owner's pumps and strainers can be used for flushing and chemical cleaning operations. When the flushing and cleaning operations are complete, insure the strainer baskets and screens installed in the piping systems permanent strainers are replaced with clean elements. Keep temporary strainers in service until the equipment has been tested, then replace straining element with a new strainer and clean and deliver the old straining elements to Owner. Fit the Owner's strainers with a line size blowoff valve.
D. Install bypass piping or hoses at the supply and return piping connections at heat exchangers, chillers, cooling towers, pumps, and cooling coils, etc., to prevent debris from being caught or causing damage to equipment which will be connected to the piping system.

E. Circulate a chemical cleaner in chilled and heating water piping systems to remove mill scale, grease, oil, and silt. Cleaner to be selected by chemical treatment vendor on project. Circulate for 48 hours, flush system and replace with clean water. Dispose of chemical solution in accordance with local codes. The chilled and heating water system should then be treated with chemicals and inhibitors to be selected by chemical treatment vendor on project. When the chemical cleaning is complete, remove, clean, and reinstall all permanent screens. Notify Owner so that the reinstallation of clean strainer screens may be witnessed.

3.6 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

END OF SECTION
SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:

1. Ductwork, Joints and Fittings
2. Insulated Flexible Duct
3. Drain Pans
4. Ductwork Joint Sealers and Sealants

1.2 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 23 05 29, Hangers and Supports for HVAC Piping, Ductwork and Equipment.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Welding Certificates
2. Field Quality Control Reports
1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NFPA Compliance:
   a. NFPA 90A Installation of Air Conditioning and Ventilating Systems.
   b. NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

2. Comply with SMACNA's HVAC Duct Construction Standards - Metal and Flexible for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Provide sheet metal materials free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

3. If required, provide ductwork pressure testing per Section 23 05 93, Testing, Adjusting and Balancing for HVAC.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.7 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air-moving and distribution equipment and other air system components. Duct design is generally diagrammatic and is not meant to be scaled. Major changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ductwork, Joints, and Fittings:

1. Ductmate

2. Lindab Inc
3. Nexus Inc
4. SEMCO
5. United McGill Corporation
6. Ward Industries
7. Or approved equivalent

B. Insulated Flexible Duct:
1. ATCO
2. Flexmaster
3. J.P. Lamborn Co.
4. Hart and Cooley
5. Or approved equivalent

C. Drain Pans:
1. Not applicable.

D. Ductwork Joint Sealers and Sealants
1. Ductmate
2. Durodyne
3. Hardcast
4. United McGill Corporation
5. Vulkem
6. Or approved equivalent

2.2 DUCTWORK, JOINTS AND FITTINGS

A. Materials:


B. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's HVAC Duct Construction Standards - Metal and Flexible and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.

2. Deflection: Duct systems not-to-exceed deflection limits according to SMACNA's HVAC Duct Construction Standards - Metal and Flexible.

3. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

C. Formed-On Flanges: construct according to SMACNA's HVAC Duct Construction Standards - Metal and Flexible, Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Duct Size: Maximum 30-inches wide and up to 2-inch wg pressure class.

2. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

3. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19-inches and larger and 0.0359-inch thick or less, with more than 10 SF of nonbraced panel area unless ducts are lined.

D. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of material specified in this Section according to SMACNA's HVAC Duct Construction Standards - Metal and Flexible.

1. Ducts up to 20-inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.

2. Ducts 21- to 72-inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
3. Ducts Larger than 72-inches in Diameter: Companion angle flanged joints per SMACNA HVAC Duct Construction Standards-Metal and Flexible, Figure 3-2.

4. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.

E. 90-Degree Tees and laterals and Conical Tees: Fabricate to comply with SMACNA's HVAC Duct Construction Standards-Metal and Flexible, with metal thicknesses specified for longitudinal-seam straight ducts.

F. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.

G. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows to be 1.5 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's HVAC Duct Construction Standards-Metal and flexible, unless otherwise indicated.

2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg (minus 500 to plus 500 Pa):
   a. Ducts 3- to 36-inches in Diameter: 0.034-inch.
   b. Ducts 37- to 50-inches in Diameter: 0.040-inch.
   c. Ducts 52- to 60-inches in Diameter: 0.052-Inch.
   d. Ducts 62- to 84-inches in diameter: 0.064-Inch.

3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
   a. Ducts 3- to 26-inches in Diameter: 0.034-inch.
   b. Ducts 27- to 50-inches in Diameter: 0.040-inch.
   c. Ducts 52- to 60-inches in Diameter: 0.052-inch.
   d. Ducts 62- to 84-inches in Diameter: 0.064-inch.

4. 90-Degree, two-piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space
restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.

5. Round Elbows
   a. 8-inches and Less in Diameter: Fabricate die-formed elbows for 45 and 90-degree elbows and pleated elbows for 30, 45, 60 and 90 degrees only. Fabricate nonstandard bend-angle configurations or non-standard diameter elbows with gored construction.
   b. 9 through 14-inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60 and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
   c. Larger than 14-inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows unless space restrictions require mitered elbows.

6. Die-Formed Elbows for Sizes through 8-inches in Diameter and Pressures 0.040-inch thick with two-piece welded construction.

7. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.

8. Pleated Elbows for Sizes through 14-inches in Diameter and Pressures through 10-inch wg (2500 Pa): 0.022-inch.

H. Flat Oval Duct
   1. Diameter as applied to flat-oval ducts in this Article is the diameter of a round duct with circumference equal to the perimeter of a given size of flat-oval duct.
   2. Flat Oval, Spiral Lock-Seam Ducts: Fabricate supply ducts according to SMACNA's HVAC Duct Construction Standards-Metal and Flexible. Fabricate ducts larger than 72-inches in diameter with butt-welded longitudinal seams.
   3. Prefabricated connection system consisting of two flanges and one synthetic rubber gasket.
   4. Flat-Oval Mitered Elbows: Welded construction with same metal thickness as longitudinal-seam flat-oval duct.
   5. Flat-Oval Elbow Metal Thickness: Same as longitudinal-seam flat-oval duct specified above.
2.3 INSULATED FLEXIBLE DUCT

A. Construction: Standard factory fabricated product. Inner wall: Impervious vinyl or chlorinated polyethylene, permanently bonded to a vinyl or zinc-coated spring steel helix.

B. Insulation: Fiberglass blanket insulation covered by an outer wall of vinyl or fiberglass-reinforced metalized vapor barrier.

C. Listing: UL 181 listed Class 1 flexible air duct material. Overall thermal transmission: No more than 0.25 BTU/in or hr/sq. degrees F at 75 degrees F differential, per ASTM C335.

D. Vapor transmission value no more than 0.10 perm, per ASTM E96

E. Pressure Rating: 4-inch wg positive pressure and 1-inch wg negative pressure.

F. Performance Air Friction Correction Factor: 1.3 maximum at 95 percent extension. Working air velocity: Minimum 2000 FPM.

G. Flame Spread Rating: No more than 25.

H. Smoke Development Rating: No more than 50 as tested per ASTM E84.

I. Insertion Loss: Minimum attenuation of 29 DB for 10-foot straight length at 8-inch diameter at 500 Hz.

2.4 DRAIN PANS

A. Primary Drain Pans: Stainless Steel, Fabricated in accordance with ASTM A167 and A480.


2.5 DUCTWORK JOINT SEALERS AND SEALANTS

A. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

B. Low Emitting Materials Requirement: Adhesives, sealants and sealant primers must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168.

C. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
D. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E 84.

E. Water Based Sealant for Brush-On Application: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts. Min. 69 percent solids, nonflammable. Durodyne Duroseal, Hardcast Versa-Grip 181, McGill United Duct Sealer.


G. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use O.

H. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.


J. Silicon Sealant: Hardcast PT-302 or equal.

K. Polyurethane Sealant: General-purpose non-brittle sealant for gunned application. Vulkem 616 or equal.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. General: Use the following pressure class(es) in design of ductwork specified in this section unless otherwise noted on Drawings.

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>PRESSURE IP (inches of water)</th>
<th>CLASS METRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium pressure supply (Fan to Terminal Unit (TU))</td>
<td>0.5-inch higher than air handlers discharge pressure (min. 4-inch pressure class).</td>
<td>996.4 PA</td>
</tr>
<tr>
<td>Low pressure supply (downstream of TU)</td>
<td>+ 1-inch</td>
<td>249 PA</td>
</tr>
<tr>
<td>Return main (&gt;24-inch)</td>
<td>0.5-inch more negative than return/exhaust fan pressure or -2-inch pressure class, whichever is more negative.</td>
<td>-498.2 PA</td>
</tr>
<tr>
<td>Return branch (&lt;24-inch)</td>
<td>0.5-inch more negative than return/exhaust fan pressure or -2-inch pressure class, whichever is more negative.</td>
<td>-249 PA</td>
</tr>
<tr>
<td>General exhaust</td>
<td>0.5-inch more negative than return/exhaust fan pressure or -2-inch pressure class, whichever is more negative.</td>
<td>-498.2 PA</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Kitchen grease exhaust</td>
<td>-6-inch</td>
<td>-1500 PA</td>
</tr>
<tr>
<td>Lab medium pressure exhaust (lab valve/TU to fan)</td>
<td>-6-inch</td>
<td>-1500 PA</td>
</tr>
<tr>
<td>Lab low pressure exhaust (upstream of lab valve/TU)</td>
<td>-1-inch</td>
<td>-249 PA</td>
</tr>
</tbody>
</table>

B. Ductwork Installation:

1. General: Install entire duct system in accordance with drawings, Specifications, and latest issues of local Mechanical Code, NFPA 90A, and SMACNA Duct Construction Manual. At Contractor’s option, rectangular ductwork may be resized to maintain an equivalent air velocity and friction rate, while maintaining a maximum aspect ratio of 3. Remove markings and tagging from ductwork exterior surface in mechanical rooms and other locations where ductwork is exposed.

2. The duct layout shown on the Contract Drawings is diagrammatic in nature. Coordinate the ductwork routing and layout, and make alterations to the ductwork routing and layout to eliminate physical interferences. Where deviations in the ductwork routing as shown in the Contract Drawings are required, alterations may be made so as not to compromise the air flow, pressure drop, and sound characteristics of the duct fitting or duct run as shown on the Contract Drawings. In the event Architect determines that the installed ductwork is inconsistent with the above mentioned criteria, remove and replace at no additional cost to the Owner.

3. Install ducts with fewest possible joints.

4. Install fabricated fittings for changes in directions, size, shape, and for connections.

5. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12-inches, with a minimum of 3 screws in each coupling.

6. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

7. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

9. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

10. Coordinate layout with suspended ceiling, air duct accessories, lighting layouts, and similar finish work.

11. Electrical and IT Equipment Spaces: route ducts to avoid passing through transformer vaults, electrical equipment spaces, IDF/MPOE rooms, and enclosures.

12. Boiler Rooms and Refrigeration Machinery Rooms: Only route ducts serving these rooms through these rooms.

13. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2-inches.

14. Fire- and Smoke-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire, smoke or combination fire and smoke dampers as governed by Building Code and AHJ, including sleeves, and firestopping sealant.


16. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's Duct Cleanliness for New Construction Advanced Level.

17. Paint interiors of metal ducts, that do not have duct liner, for 24-inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible duct material.

18. Install ductwork in the location and manner shown and detailed. Review deviations required by job conditions with Architect prior to any fabrication. Provide fittings for construction per SMACNA.

C. Flanged Take-Offs:
1. Install at branch takeoffs to outlets using round or flex duct.

2. Flanged take-offs secured with minimum 8-inch screw spacing (three screws minimum).

3. Provide ductwork taps and branches off of main ducts at 45 degrees whether shown on Drawings or not (drawings are diagrammatic).

D. Cleaning:

1. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

2. Grille and Exposed Duct Cleaning:
   a. After completion of ductwork installation, operate each fan system (excluding exhaust fans) for a minimum of 30 minutes prior to installation of ceiling grilles and diffusers. After grilles and diffusers are installed, clean out accumulation of particles from grilles and diffusers prior to acceptance.
   b. Clean exterior surface of ducts exposed to public view of chalk, pencil and pen marks, labels, sizing tags, dirt, dust, etc., so that upon completion of installation, ducts are left in clean and unblemished manufactured conditions.
   c. Exposed duct and grilles to remain free of dust entrained streaks due to leakage at joints and grille connections during warranty period. Clean leaks, seal and refinish to match existing if visible streaks develop.

3.2 DUCTWORK, JOINTS AND FITTINGS INSTALLATION

A. Duct Materials - Applied Locations:

1. General: Use the following materials in design of ductwork specified in this Section unless otherwise noted on the Drawings.

<table>
<thead>
<tr>
<th>Location or Application</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply, Return, Transfer, and Exhaust - Low Pressure (downstream of terminal units)</td>
<td>Single Wall, Galvanized Steel</td>
</tr>
<tr>
<td>Supply, Return, and Exhaust - Medium Pressure (upstream of terminal units)</td>
<td>Single Wall, Galvanized Steel</td>
</tr>
<tr>
<td>General Exhaust Branch Serving Air Inlet in Shower Room or Toilet Room with Shower</td>
<td>Single Wall, Aluminum or Type 304 Stainless Steel</td>
</tr>
<tr>
<td>Supply, Return, Exhaust in Natatorium, Pool, or Spa Area</td>
<td>Single Wall, Aluminum or Type 304 Stainless Steel</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Fume Hood Exhaust</td>
<td>Single Wall, Type 316 Stainless Steel</td>
</tr>
<tr>
<td>Ductwork for the First 15-feet Downstream of Humidifier</td>
<td>Single Wall, Type 316 Stainless Steel</td>
</tr>
</tbody>
</table>

B. **Ductwork Installation:**

1. Fabricate radius elbows with centerline radius not less than 1-1/2 duct diameters.

2. Do not install duct size transition pitch angles which exceed 30 degrees for reductions in duct size in the direction of airflow, and 15 degrees for expansions in duct size in the direction of airflow.

3. Install fixed turning vanes in square throat rectangular elbows and in tees.

4. In healthcare settings such as hospitals and medical office buildings, use radius elbows in return and exhaust applications (even where not shown as such on drawings) to avoid turning vanes within the return and exhaust air stream.

5. Fabricate duct turns with the inside (smallest) radius at least equal to the duct width (supply ducts) and 1.5 times radius (return and exhaust ducts). Where necessary, square elbows may be used, with maximum available inside radius and with fixed turning vanes. In healthcare settings such as hospitals and medical office buildings, square elbows and turning vanes allowed on supply ductwork only.

3.3 **INSULATED FLEXIBLE DUCT INSTALLATION**

A. Install flexible duct with bend radius equal to 1.5 times the diameter. Minimum length 2-feet. Maximum length 5-feet, unless noted otherwise.

1. Provide round neck grilles/diffusers or square-to-round transitions. Flex duct connections directly to square neck not allowed.

2. Flex duct allowed in concealed spaces above lay-in ceilings only.

3.4 **DRAIN PANS INSTALLATION**

A. Install where shown on Drawings. Drain provided by Division 22, Plumbing. Provide drain (sized per code) connection from each drain pan and pipe to nearest floor drain through trap and 10-inch air gap. Drain pans over 6-feet in length require drain connections.
from both ends. Pitch drain pans in direction of air flow and to drain. Support secondary drain pan independently from equipment.

3.5 DUCTWORK JOINT SEALERS AND SEALANTS INSTALLATION

A. Joints and Seam Joint Sealing:

1. Seal duct seams and joints according to SMACNA's HVAC Duct Construction Standards - Metal and Flexible for duct pressure class indicated.

2. For pressure classes lower than 2-inch wg (500 Pa), seal transverse joints.

3. Seal ducts before external insulation is applied.

4. Tape joints of PVC coated metal ductwork with PVC tape.

5. Fasteners such as sheet-metal screws, machine screws or rivets to be cadmium plated.

6. Rectangular Ductwork: Where intermediate joint reinforcement is required for duct of negative pressure class, pre-drill stiffening flange and provide fastener maximum 8-inches on center. Where retaining flanges are welded to duct wall, paint welds with zinc coating.

7. Single Wall Round Ductwork: Joint to incorporate beaded slip collar with minimum #8 sheet metal screws 8-inches on center. Seal ductwork as specified in this Section.

8. Seal joints and seams. Apply sealant to make end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

9. Double Wall Round Ductwork: Joint to incorporate beaded slip collar or flanged connection, with minimum #8 sheet metal screws 8-inches on center. Seal ductwork as specified in this Section.

10. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

11. Provide openings in ductwork where required to accommodate thermometers and control devices. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
12. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities as well as Code required clearances.

END OF SECTION
SECTION 26 00 00
ELECTRICAL BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work included in 26 00 00, Electrical Basic Requirements applies to Division 26, Electrical work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of electrical systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.

2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.

3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.

4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.

5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

A. Contents of Section applies to Division 26, Electrical Contract Documents.

B. Related Work:
1. Additional conditions apply to this Division including, but not limited to:

   a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.

   b. Drawings

   c. Addenda

   d. Owner/Architect Agreement

   e. Owner/Contractor Agreement

   f. Codes, Standards, Public Ordinances and Permits

1.3 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 26, Electrical Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

   1. State of California:

      a. CBC California Building Code

      b. CEC California Electrical Code

      c. CEC T24 California Energy Code Title 24

      d. CFC California Fire Code

      e. CMC California Mechanical Code

      f. CPC California Plumbing Code

      g. CSFM California State Fire Marshal

      h. DSA Division of State Architect Regulations and Requirements

C. General: Reference standards and guidelines include but are not limited to the latest adopted editions from:
1. ADA  Americans with Disabilities Act
2. ANSI  American National Standards Institute
3. APWA  American Public Works Association
4. ASCE  American Society of Civil Engineers
5. ASHRAE Guideline O, the Commissioning Process
6. ASTM  ASTM International
7. CFR  Code of Federal Regulations
8. CSA  CSA International
9. EEMAC  Electrical Equipment Manufacturers Association of Canada
10. EPA  Environmental Protection Agency
11. ETL  Electrical Testing Laboratories
12. FCC  Federal Communications Commission
13. FDA  Food & Drug Administration
14. FM  FM Global
15. IBC  International Building Code
16. IEC  International Electrotechnical Commission
17. IEEE  Institute of Electrical and Electronics Engineers
18. IES  Illuminating Engineering Society
19. ISO  International Organization for Standardization
20. MSS  Manufacturers Standardization Society
21. NEC  National Electric Code
22. NECA  National Electrical Contractors Association
23. NEMA  National Electrical Manufacturers Association
24. NETA  National Electrical Testing Association
25. NFPA National Fire Protection Association
26. OSHA Occupational Safety and Health Administration
27. UBC Uniform Building Code
28. UL Underwriters Laboratories Inc.
29. USDA United States Department of Agriculture

D. See Division 26, Electrical individual Sections for additional references.

E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

F. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

1.4 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as individual Division 26, Electrical Sections.

B. In addition:

1. "No Exceptions Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

2. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail or posted to ftp site. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Architect.
3. Product Data: Provide manufacturer’s descriptive literature for products specified in Division 26, Electrical Sections.

4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and drawings.

   a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.

   b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 26, Electrical specification Sections for specific items required in product data submittal outside of these requirements.

   c. See Division 26, Electrical individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.

6. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-10 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Part 3 of this Section.

   a. Special Seismic Certification to be provided for the following equipment and components that are part of the designated seismic system pursuant to Section 13.2.2, ASCE/SEI (Structural Engineers Institute).

      1) Distribution panels including electrical panelboards, control panels, including fire alarm, and auxiliary or remote power supplies.
7. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 26, Electrical Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.

8. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

9. Substitutions and Variation from Basis of Design:
   a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
   b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

10. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 26, Electrical specification Sections for additional requirements for shop drawings outside of these requirements.
   a. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

11. Samples: Provide samples when requested by individual Sections.

12. Resubmission Requirements:
a. Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.

b. Resubmit for review until review indicates no exceptions taken or "make corrections as noted".

13. Operation and Maintenance Manuals, Owners Instructions:

a. Submit, at one time, one bound copy and electronic files (PDF format) on CD/DVD of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.

2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment.

3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

4) Include product certificates of warranties and guarantees.

5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub assemblies.

6) Include commissioning reports.

7) Include copy of startup and test reports specific to each piece of equipment.
8) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 26 00 00, Electrical Basic Requirements, Demonstration.

c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

14. Record Drawings:

a. Maintain at site at least one set of drawings for recording "As-constructed" conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed electrical items. Include items changed by field orders, supplemental instructions, and constructed conditions.

b. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.

c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD disk and drawings upon substantial completion.

d. See Division 26, Electrical individual Sections for additional items to include in record drawings.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations.

B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact
dimensions, or details of equipment or proposed systems layout. Verify actual
dimensions of systems (i.e. distribution equipment, duct banks, light fixtures, etc.) and
equipment proposed to assure that systems and equipment will fit in available space.
Contractor is responsible for design and construction costs incurred for equipment
other than Basis of Design, including, but not limited to, architectural, structural,
electrical, HVAC, fire sprinkler, and plumbing systems.

C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict
with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing,
before starting work.

D. Items shown on Drawings are not necessarily included in Specifications or vice versa.
Confirm requirements in all Contract Documents.

E. UL and CSA Compliance: Provide products which are UL listed

1.6 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of
Substantial Completion in accordance with Division 00, Procurement and Contracting
Requirements and Division 01, General Requirements, Section 26 00 00, Electrical Basic
Requirements and individual Division 26, Electrical Sections.

B. Sections under this Division can require additional and/or extended warranties that
apply beyond basic warranty under Division 01, General Requirements and the General
Conditions. Confirm requirements in all Contract Documents.

1.7 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment,
ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers,
plumbing, lights, cable tray and electrical services with architectural and structural
requirements, and other trades (including ceiling suspension and tile systems), and
provide maintenance access requirements. Coordinate with submitted architectural
systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including
footings and foundation. Identify zone of influence from footings and ensure systems
are not routed within the zone of influence.

B. Advise Architect in event a conflict occurs in location or connection of equipment. Bear
costs resulting from failure to properly coordinate installation or failure to advise
Architect of conflict.

C. Verify in field exact size, location, and clearances regarding existing material, equipment
and apparatus, and advise Architect of discrepancies between that indicated on
Drawings and that existing in field prior to installation related thereto.
D. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide like items from one manufacturer.

2.2 MATERIALS

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL approved or have adequate approval or be acceptable by state, county, and city authorities. Equipment/fixture supplier is responsible for obtaining State, County, and City acceptance on equipment/fixtures that are not UL approved or are not listed for installation.

B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

D. Hazardous Materials:

1. Comply with local, State of California, and Federal regulations relating to hazardous materials.

2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.

3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

2.3 ACCESS PANELS

A. See Division 01, General Requirements and Division 08, Openings for products and installation requirements.

B. Confirm Access Panel requirements in Division 01, General Requirements, Division 08, Openings and individual Division 26, Electrical Sections. In the absence of specific requirements, comply with the following:
1. Provide flush mounting access panels for service of systems and individual components requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly.
   a. Ceiling access panels to be minimum of 24-inch by 24-inch.
   b. Wall access panels to be minimum of 12-inch by 12-inch.
   c. Provide screwdriver operated catch.
   d. Manufacturers and Models:
      1) Drywall: Karp KDW.
      2) Plaster: Karp DSC-214PL.
      3) Masonry: Karp DSC-214M.
      4) 2 hour rated: Karp KPF-350FR.
      5) Manufacturers: Milcor, Elmdor, Acudor, or approved equivalent.

PART 3 - EXECUTION

3.1 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Install equipment requiring access (i.e., junction boxes, light fixtures, power supplies, motors, etc.) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in passageways, doorways, scuttles or crawlspaces which would impede or block the intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.

D. Earthwork:
1. Confirm Earthwork requirements in Contract Documents. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork Sections. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.

b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.

c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm requirements in Division 07, Thermal and Moisture Protection. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Plenums:

1. In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

G. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

H. Provide miscellaneous supports/metal required for installation of equipment and conduit.

3.2 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and Individual Division 26 Electrical Sections.
B. Equipment Importance Factor: 1.0.

C. General:

1. Confirm Building Occupancy Category and Seismic Design Category with Structural Engineer.

2. Earthquake resistant designs for Electrical (Division 26, Electrical) equipment and distribution, i.e. power distribution equipment, generators, UPS, etc. to conform to regulations of jurisdiction having authority.

3. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.

4. Provide stamped shop drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for conduit and equipment. Submit shop drawings along with equipment submittals.

5. Provide stamped shop drawings from licensed Structural Engineer of seismic flexible joints for conduit crossing building expansion or seismic joints. Submit shop drawings along with seismic bracing details. Coordinate exact design requirements with project Structural Engineer.

D. Equipment:

1. Provide means to prohibit excessive motion of electrical equipment during earthquake.

3.3 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground conduit installation prior to backfilling.

2. Prior to covering walls.
3. Prior to ceiling cover/installation.

4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch:

1. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.4 CONTINUITY OF SERVICE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements in Division 01, General Requirements, comply with individual Division 26, Electrical Sections and the following:

1. During remodeling or addition to existing structure, while existing structure is occupied, present services to remain intact until new construction, facilities or equipment is installed.

2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new wiring, and wiring to point of connection.

3. Coordinate transfer time to new service with Owner. If required, perform transfer during off-peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum.

   a. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.

4. No interruption of services to any part of existing facilities will be permitted without express permission in each instance from Owner. Requests for outages must state specific dates, hours and maximum durations, with outages kept to these specific dates, hours and maximum durations. Obtain written permission from Owner for any interruption of power, lighting or signal circuits and systems.

   a. Organize work to minimize duration of power interruption.

   b. Coordinate utility service outages with utility company.

3.5 CUTTING AND PATCHING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements in Division
01, General Requirements, comply with individual Division 26, Electrical Sections and
the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by project
   Structural Engineer. Submit proposed locations to Architect/Project Structural
   Engineer. Where slabs are of post tension construction, perform x-ray scan of
   proposed penetration locations and submit scan results including proposed
   penetration locations to Project Structural Engineer/Architect for approval.
   Where slabs are of waffle type construction, show column cap extent and cell
   locations relative to proposed penetration(s).

2. Cutting, patching and repairing for work specified in this Division including
   plastering, masonry work, concrete work, carpentry work, and painting included
   under this Section and will be performed by skilled craftsmen of each respective
   trade in conformance with appropriate Division of Work.

3. Additional openings required in building construction to be made by drilling or
   cutting. Use of jack hammer is specifically prohibited. Patch openings in and
   through concrete and masonry with grout.

4. Restore new or existing work that is cut and/or damaged to original condition.
   Patch and repair specifically where existing items have been removed. This
   includes repairing and painting walls, ceilings, etc. where existing conduit and
   devices are removed as part of this project. Where alterations disturb lawns,
   paving, and/or walks, surfaces to be repaired, refinished and left in condition
   matching existing prior to commencement of work.

5. Additional work required by lack of proper coordination will be provided at no
   additional cost to the Owner.

3.6 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit
   servicing, at no additional cost to Owner.

3.7 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and
   Division 01, General Requirements. In the absence of specific requirements, comply
   with individual Division 26, Electrical Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store
   materials on site inside building or protected from weather, dirt and
   construction dust. Products and/or materials that become damaged due to
   water, dirt, and/or dust as a result of improper storage and handling to be
   replaced before installation.
2. Protect equipment to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3. Protect bus duct and similar items until in service.

3.8 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 08 00, Commissioning of Electrical and Individual Division 26, Electrical Sections.

B. Upon completion of work and adjustment of equipment, test systems and demonstrate to Owner's Representative, Architect, and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.9 CLEANING

A. Confirm Cleaning requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Upon completion of installation, thoroughly clean electrical equipment, removing dirt, debris, dust, temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.10 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Install equipment and fixtures in accordance with manufacturer's installation instructions, plum and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

D. Provide miscellaneous supports/metals required for installation of equipment.

3.11 PAINTING

A. Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

   1. Ferrous Metal: After completion of work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces (i.e., hangers, hanger rods, equipment stands, etc.) with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.

   2. In Electrical Room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.

   3. See individual equipment Specifications for other painting.

   4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

   5. Conduit: Clean, primer coat and paint interior/exterior conduit exposed in public areas with two coats paint suitable for metallic surfaces. Color selected by Architect.

   6. Covers: Covers such as manholes, vaults and the like will be furnished with finishes which resist corrosion and rust.

3.12 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In the absence of specific requirements in Division 01, General Requirements, comply with individual Division 26, Electrical Sections and the following:

   1. Coordinate locations/sizes of access panels with Architect prior to work.

3.13 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing Conditions. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
1. It is the intent of these documents to provide necessary information and adjustments to electrical system required to meet code, and accommodate installation of new work.

2. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas. Owner will cooperate to best of their ability to assist in coordinated schedule, but will remain final authority as to time of work permitted.

3. Examination:
   a. Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to locate and preserve utilities. Replace damaged items with new material to match existing.
   b. Verify that abandoned wiring and equipment serve only abandoned facilities.
   c. Demolition drawings are based on casual field observation and existing record documents.
      1) Verify accuracy of information shown prior to bidding and provide such labor and material as is necessary to accomplish work.
      2) Verify location and number of electrical outlets, luminaires, panels, etc. in field.
   d. Report discrepancies to Architect before disturbing existing installation.
      1) Promptly notify Owner if utilities are found which are not shown on Drawings.

4. Execution:
   a. Remove existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
   b. Provide temporary wiring and connections to maintain electrical continuity of existing systems during construction. Remove or relocate electrical boxes, conduit, wiring, equipment, and luminaires, as encountered in removed or remodeled areas in existing construction affected by this work.
c. Remove and restore wiring which serves usable existing outlets clear of construction or demolition.

d. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass inaccessible junction boxes and abandoned outlets.

e. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of construction or demolition and maintain service to existing load.

f. Extend circuiting and devices in existing walls to be furred out.

g. Remove abandoned wiring to source of supply.

h. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

i. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

j. Disconnect and remove abandoned panelboards and distribution equipment.

k. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

l. Existing lighting which is to remain, leave luminaires in proper working order.

m. Repair adjacent construction and finishes damaged during demolition work.

n. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

3.14 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
   a. Cleaning
   b. Operation and Maintenance Manuals
   c. Training of Operating Personnel
   d. Record Drawings
   e. Warranty and Guaranty Certificates
   f. Start-up/Test Document and Commissioning Reports

3.15 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Tests:
   1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
   2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.16 LETTER OF CONFORMANCE

A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that Electrical items were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

3.17 SALVAGED EQUIPMENT

A. Salvage the following equipment not being reused and return to Owner:
   1. Luminaires
B. Electrical equipment that cannot be salvaged for reuse sell/give to recycling company.

C. Provide separate on-site storage space for salvaged material. Clearly label space.

D. Confirm additional salvaged equipment and recycled materials in the Contract Documents.

END OF SECTION
SECTION 26 05 09
EQUIPMENT WIRING

PART 1 - GENERAL

1.1 SUMMARY
A. Work included: Provision of materials, installation and testing of:
   1. Equipment connections, whether furnished by Owner or other Divisions of the Contract.
   2. Equipment grounding.

1.2 RELATED SECTIONS
A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS
A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS
A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE
A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements apply to this Section.

1.6 WARRANTY
A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Materials and Equipment for Equipment Wiring: As specified in individual Sections.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to submittal of product data for electrical distribution equipment, obtain and examine product data and shop drawings for equipment furnished by the Owner and by other trades on the project. Update the schedule of equipment electrical connections accordingly, noting proper ratings for overcurrent devices, fuses, safety disconnect switches, conduit and wiring, and the like. As a minimum, this requirement applies to equipment furnished by Owner and equipment furnished under the following divisions of work under this contract:

1. Division 10, Specialties.
2. Division 11, Equipment.
3. Division 21, Fire Suppression.
4. Division 22, Plumbing.
5. Division 23, HVAC, Heating, Ventilating and Air Conditioning.

B. Unless otherwise noted in Contract Documents, the following voltage and phase characteristics apply to motors:

1. 1/2 HP and Under: 120 volt, 1 phase.
2. 3/4 HP and Over: 208 volt, 3 phase.
3. 3/4 HP and Over: 480 volt, 3 phase.

C. Verify mechanical and utilization equipment electrical characteristics with Drawings and equipment submittals prior to ordering equipment. Submit confirmation of this verification as a part of, or addendum to, the electrical product submittals.

3.2 INSTALLATION

A. Do not install electrical equipment or wiring on mechanical equipment without prior approval of Engineer.

B. Provide moisture tight equipment wiring and switches in ducts or plenums used for environmental air.

C. Connect motor and appliance/utilization equipment complete from panel to motor/equipment as required by code.
D. Install motor starters and controllers for equipment furnished by others.

E. Safety Switches: Provide as required by CEC and as directed in Section 26 28 16, Enclosed Switches and Circuit Breakers.

F. Appliance/Utilization Equipment:

1. Provide appropriate cable and cord cap for final connection unless equipment is provided with same. Provide receptacle configured to receive cord cap.

2. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering wiring devices and coverplates.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Division 01, General Requirements.

3.4 SYSTEMS STARTUP

A. Provide field representative to prepare and start equipment.

1. Test and correct for proper rotation of polyphase motors.

B. Adjust for proper operation within manufacturer's published tolerances.

C. Demonstrate proper operation of equipment to Owner's designated representative.

END OF SECTION
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:

1. Wires and Cables
2. Connectors
3. Lugs and Pads

1.2 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Cable insulation test reports in project closeout documentation.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wires and Cables:
   1. Carol
   2. General Cable
   3. Okonite
   4. Southwire
   5. Or approved equivalent.

B. Connectors:
   1. Stranded conductors by Anderson.
   2. Burndy
   3. Ilsco
   4. 3M
   5. Thomas & Betts
   6. Or approved equivalent.

C. Splices:
   1. Branch Circuit Splices:
      a. Ideal
      b. Scotch-Lock
      c. 3M
      d. Or approved equivalent.
   2. Feeder Splices:
      a. Not allowed.

D. Metal Clad Cable - Type MC:
1. Alfex
2. AFC
3. Carol
4. Southwire
5. Or approved equivalent.

E. Armored Cable - Type AC:
1. Alfex
2. AFC
3. Carol
4. Southwire
5. Or approved equivalent.

F. Connectors:
1. Construction:
   a. T & B Series 60200
   b. Or approved equivalent.
2. Oxide-Inhibiting Joint Compounds:
   a. PENETROX A-13
   b. Or approved equivalent.
3. Fluorescent Luminaire Disconnect:
   a. Thomas & Betts Sta-Kon
   b. Lithonia
   c. Or approved equivalent.

G. Lugs:
1. Anderson
2. Ilsco
3. Panduit
4. Thomas & Betts
5. 3M
6. Or approved equivalent.

2.2 WIRES AND CABLES

A. Copper, 600 volt rated throughout. Conductors 12 AWG and 10 AWG, solid or stranded. Conductors 8 AWG and larger, stranded. 12 AWG minimum conductor size. Minimum insulation rating of 90 degrees C. Insulation Type: THWN-2, XHHW-2 or THHN-2.

B. Phase color to be consistent at feeder terminations; A-B-C, top to bottom, left to right, front to back.

C. Color Code Conductors as Follows:

<table>
<thead>
<tr>
<th>PHASE</th>
<th>208 VOLT WYE</th>
<th>480 VOLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Black</td>
<td>Brown</td>
</tr>
<tr>
<td>B</td>
<td>Red</td>
<td>Orange</td>
</tr>
<tr>
<td>C</td>
<td>Blue</td>
<td>Yellow</td>
</tr>
<tr>
<td>Neutral</td>
<td>White</td>
<td>Gray</td>
</tr>
<tr>
<td>Ground</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Isolated Ground</td>
<td>Green w/yellow trace</td>
<td>N/A</td>
</tr>
</tbody>
</table>

D. MC Cable: High strength galvanized aluminum flexible armor. Full length minimum size No. 12 copper ground wire, THHN 90C conductors, full length tape marker phase/circuit identification on cable armor. Short circuit throat insulators, mechanical compression termination.

E. SO Cord: Annealed copper conductors, 600 volt rated. Minimum size No. 12 AWG with ground wire. Maximum of six conductors and ground per cable. 90 degrees C rated thermoset jacket.

F. AC Cable (Armored Cable): Continuous corrugated aluminum armor, black PVC jacket, with grounding conductor, XHHW-2 90 degrees C conductors, full length tape marker on jacket.
2.3 CONNECTORS

A. Copper Pads: Drilled and tapped for multiple conductor terminals.

B. Lugs: Compression type for use with stranded branch circuit or control conductors; mechanical lugs for use with solid branch and feeder circuit conductors.

C. Split bolt connectors not allowed.

D. Conductor Branch Circuits: Wire nuts with integral spring connectors for conductors 12 AWG through 8 AWG. Push-in type connectors where conductors are not required to be twisted together are not acceptable.


2.4 LUGS AND PADS

A. Ampacity: Cross-Sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wires and Cables:

1. Conductor Installation:
   a. Install conductors in raceways having adequate, code size cross-Sectional area for wires indicated.
   b. Install conductors with care to avoid damage to insulation.
   c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
   d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFCI circuit breakers or GFCI receptacles.

2. Conductor Size and Quantity:
a. Install no conductors smaller than 12 AWG unless otherwise shown.
b. Provide required conductors for a fully operable system.

3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single phase circuits:
   a. Multi-conductor branch circuits fed from single-pole overcurrent protective devices.
   b. Dimmer controlled circuits.
   c. Isolated ground circuits.
   d. Ground fault protected circuits where a GFCI breaker is used in a panelboard.
   e. Other electronic equipment which produces a high level of harmonic distortion including, but not limited to, computers, printers, plotters, copy machines, and fax machines.

4. Conduits in Cabinets:
   a. Cable and tree wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets.
   b. Tie and bundle feeder conductors in wireways of panelboards.
   c. Hold conductors away from sharp metal edges.

5. Homeruns:
   a. Do not change intent of branch circuit homers without approval. Homeruns for 20A branch circuits may be combined to a maximum of six current carrying conductors including neutral conductors in homers. Apply derating factors as required per NEC. Increase conductor size as needed.

6. Identify wire and cable under the provisions of Section 26 05 53, Identification for Electrical Systems. Identify each conductor with its panel and circuit number as indicated.

7. Use of MC/AC Cable is limited to the following conditions. Installations that do not comply with the following conditions are to be removed and replaced with no additional expense to the Owner.
a. 20 and 30 amp branch wiring where following conditions apply:

1) Where there is a suspended ceiling with accessible space above (example: suspended acoustic ceiling tile).

2) For drops to ceiling mounted luminaires in areas with accessible ceiling space.

3) Do not use for homeruns from branch circuit panel to first device or luminaire in circuit.

4) Do not use in walls in areas where MC cable cannot be fished into the walls after construction is completed. For example: walls with glazing or solid beams overhead, partial height walls, etc.

5) No single run of MC/AC cable longer than 50-feet.

3.2 FIELD QUALITY CONTROL

A. Test conductor insulation on feeders of 100 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.

B. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit test reports with project closeout documents.

C. Inspect and test in accordance with NETA Standard ATS, except Section 4.

D. Perform inspections and tests listed in NETA Standard ATS, Section 7.3.2.

END OF SECTION
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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Connectors and Accessories
   2. Grounding Conductor

1.2 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:
   1. Comply with the requirements of ANSI/NFPA 70.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Grounding Connectors:
   1. Burndy Hyground Compression System
   2. Erico/Cadweld
   3. Amp Ampact Grounding System
   4. Or approved equivalent.

B. Pipe Grounding Clamp:
   1. Burndy GAR Series
   2. OZ Gedney
   3. Thomas & Betts
   4. Or approved equivalent.

2.2 CONNECTORS AND ACCESSORIES

A. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors.

B. Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe.

2.3 GROUNDING CONDUCTOR

A. Grounding Electrode Conductor: Soft-draw bare stranded copper for wire sizes larger than 10 AWG Bare. Solid copper for wire sizes 10 AWG and smaller.

B. Equipment Grounding Conductor: Green insulated, insulation type to match that of associated feeder or branch circuit wiring, size as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions prior to beginning work.
B. Verify that final backfill and compaction have been completed before driving rod electrodes.

3.2 INSTALLATION

A. Raceways:

1. Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay-in lug.

2. Connect metal raceways, which terminate within an enclosure but without mechanical connection to enclosure, by grounding bushings and ground wire to grounding bus.

3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.

4. Install equipment grounding conductor, code size minimum unless noted on drawings, in metallic raceway systems.

B. Feeders and Branch Circuits:

1. Provide continuous green insulated copper equipment grounding conductors for feeders and branch circuits.

2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment grounding conductors for feeders and branch circuits sized in accordance with NEC Article 250, Table 250-122.

C. Boxes, Cabinets, Enclosures and Panelboards:

1. Bond grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.

2. Bond Sections of service equipment enclosure to service ground bus.

D. Motors, Equipment and Appliances: Install code size equipment grounding conductor to (motor) equipment frame or manufacturer's designated ground terminal.

E. Receptacles: Connect ground terminal of receptacle and associated outlet box to equipment grounding system. Self grounding nature of receptacle devices does not eliminate equipment grounding conductor bolted to outlet box.
F. Corrosion inhibitors: Apply a corrosion inhibitor to contact surfaces when making
grounding and bonding connections. Use corrosion inhibitor appropriate for protecting
a connection between metals used.

3.3 FIELD QUALITY CONTROL

A. Grounding system resistance to ground not to exceed 25 ohms. Make necessary
modifications or additions to grounding electrode system for compliance. Provide final
tests to assure that this requirement is met.

B. Resistance of grounding electrode system: measure using a four-terminal
fall-of-potential method as defined in IEEE 81. Ground resistance measurements made
before electrical distribution system is energized and be made in normally dry
conditions not less than 48 hours after last rainfall. Resistance measurements of
separate grounding electrode systems be made before systems are bonded together
below grade. Combined resistance of separate systems may be used to meet required
resistance, but specified number of electrodes must still be provided.

C. Inspect and test in accordance with NETA Standard ATS, Except Section 4.

D. Perform inspections and tests listed in NETA Standard AB, Section 7.13.

END OF SECTION
SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provision of materials, installation and testing of:
   1. Hangers, Supports, Anchors, Threaded Rod and Fasteners
   2. Support Channel
   3. Rooftop Conduit Supports

1.2 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. Submittals not required for this Section.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:
   1. Manufacturers regularly engaged in the manufacture of bolted metal framing support systems, whose products have been in satisfactory use in similar service for not less than 10 years.
   2. Support systems to be supplied by a single manufacturer.
3. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, equipment hangers/supports, and seismic restraint by a qualified Structural Professional Engineer.

   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 hangers and supports that are similar to those indicated for this Project in material, design, and extent.

1.6 WARRANTY

   A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.7 PERFORMANCE REQUIREMENTS

   A. General: Provide conduit and equipment hangers and supports in accordance with the following:

   1. When supports, anchorages, and seismic restraints for equipment and supports, anchorages and seismic restraints for conduit, cable tray and equipment are not shown on the Drawings, the Contractor is responsible for their design.

   2. Connections to structural framing shall not introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

   B. Engineered Support Systems: The following support systems to be designed, detailed, and bear the seal of a professional engineer registered in the State of California.

   1. Support frames such as conduit racks or stanchions for conduit and equipment which provide support from below.

   2. Equipment and piping support frame anchorage to supporting slab or structure.

   C. Provide channel support systems, for conduits to support multiple conduits capable of supporting combined weight of support systems and system contents.

   D. Provide heavy-duty steel trapezes for piping to support multiple conduit capable of supporting combined weight of supported systems and system contents.

   E. Provide seismic restraint hangers and supports for conduit and equipment.
F. Obtain approval from AHJ for seismic restraint hanger and support system to be installed for piping and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Support Channel:

1. B-Line
2. Kindorf
3. Superstrut
4. Unistrut
5. Or approved equivalent.

B. Anchors:

1. Anchor It
2. Epcon System
3. Hilti-Hit System
4. Power Fast System
5. Or approved equivalent.

C. Rooftop Supports:

1. Cooper B-Line Dura-Block Rooftop Support Base
2. Or approved equivalent.

2.2 MATERIALS

A. Hangers, Supports, Anchors, Threaded Rod and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

2. Coating: Hot dip galvanized.
B. Concrete Inserts: Cast in concrete for support fasteners for loads up to 800 lbs.

C. Pipe Straps: Two-hole galvanized or malleable iron.

D. Luminaire Chain: 90 lb. test with steel hooks.

E. Anchor Bolts for Area Luminaire Poles: As supplied by area luminaire pole manufacturer.

F. Anchors and Fasteners:
   1. Do not use powder-actuated anchors.
   2. Obtain permission from Architect before using powder-actuated anchors.
   3. Concrete Structural Elements: Use expansion anchors.
   4. Steel Structural Elements: Use beam clamps.
   5. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   7. Solid Masonry Walls: Use expansion anchors.

G. Rooftop Conduit Supports:
   1. Curb base made of 100 percent recycled rubber and polyurethane prepolymer with a uniform load.
   2. Capacity of 500 pounds per linear foot of support.
   3. UV resistant.
   4. Steel Frame: Steel, 14 gauge strut galvanized per ASTM A653 or 12 gauge strut galvanized per ASTM A653 for bridge series.
   5. Continuous block channel supports with 1-inch gaps to allow water flow, bridge channel supports, extendable height channel supports and elevated single conduit supports.
6. Attaching Hardware: Zinc-plated threaded rod, nuts and attaching hardware per ASTM B633 fastened directly into rubber material with weather resistant Type 12 lag screws.

7. Provide load distribution plates when required for heavy loads.


2.3 MISCELLANEOUS METAL

A. Miscellaneous Metal: Provide miscellaneous metal items specified hereunder, including materials, fabrication, fastenings and accessories required for finished installation, where indicated on Drawings or otherwise not shown on drawings that are necessary for completion of the project. The Contractor is responsible for their design.

1. Fabricate miscellaneous units to size shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

B. Structural Shapes: Where miscellaneous metal items are needed to be fabricated from structural steel shapes and plates, provide members constructed of steel conforming with requirements of ASTM A36 or approved equivalent.

C. Steel Pipe: Provide seamless steel pipe conforming to requirements of ASTM A53, Type S, Grade A, or Grade B. Weight and size required as specified.

D. Fasteners: Provide fasteners of types as required for assembly and installation of fabricated items; surface-applied fasteners are specified elsewhere.

E. Bolts: Low carbon steel externally and internally threaded fasteners conforming with requirements of ASTM A307; include necessary nuts and plain hardened washers. For structural steel elements supporting mechanical material or equipment from building structural members or connection thereto, use fasteners conforming to ASTM A325.

F. Miscellaneous Materials: Provide incidental accessory materials, tools, methods, and equipment required for fabrication.

G. Provide hot dipped galvanized components for items exposed to weather.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.

B. Safety factor of 4 required for every fastening device or support for electrical equipment installed. Supports to withstand four times the weight of equipment it supports.

C. Verify mounting height of luminaires prior to installation when heights are not detailed.

D. Install vertical support members for equipment and luminaires, straight and parallel to building walls.

E. Install horizontal support members straight and parallel to ceilings or finished floor unless otherwise noted.

F. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over suspended ceilings.

G. Do not use other trade's fastening devices as supporting means for electrical luminaires, equipment or materials.

H. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

I. Do not use supports or fastening devices to support other than one particular item.

J. Support conduits within 18-inches of outlets, boxes, panels, cabinets and deflections unless more stringently required by CEC.

K. Maximum distance between supports not to exceed 8 foot spacing unless otherwise required by CEC.

L. Support flexible conduits and metal clad cable within 12-inches of outlets, boxes, panels, cabinets and deflections unless otherwise required by CEC.

M. Maximum distance between supports for flexible conduits and metal clad cable not to exceed 48-inches spacing unless otherwise required by CEC.

N. Maximum distance between supports for rigid PVC conduits unless otherwise required by CEC is as follows:

1. 1/2-inch or 3/4-inch and 1-inch conduit, 3-feet apart.
2. 1-1/4-inch or 1-1/2-inch and 2-inch conduit, 4-feet apart.
3. 2-1/2-inch and 3-inch conduit, 5-feet apart.
4. 4-inch and 5-inch conduit, 6-feet apart.
5. 6-inch conduit, 7-feet apart.

O. Maximum distance between supports for auxiliary gutters and wireways unless otherwise required by CEC is as follows:
   1. Sheet metal auxiliary gutters and wireways - 4-feet apart horizontally and 10-feet vertically.
   2. Non-metallic auxiliary gutters and wireways - 30-inches apart horizontally and 3-feet vertically.

P. Install strut hangers as instructed by strut manufacturer. Suspended strut hangers as instructed by strut manufacturer for the load, with a maximum spacing of 8-feet on center and within 2-feet of outlet box, cabinet, junction box or other channel raceway termination unless otherwise required by CEC.

Q. Coordinate routing of conduit racks with materials and equipment installed by other trades. Where conduit racks are exposed to view, coordinate location and installation with Architect for optimal appearance.

R. Securely suspend junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from floor above or roof structure to prevent sagging and swaying.

S. Provide seismic bracing per CBC requirements.

T. Where service disconnects are mounted on building exterior, physically attach service disconnect to the building or structure served.

U. Install surface-mounted cabinets and panelboards with minimum of four anchors.

V. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

W. Use spring lock washers under fastener nuts for strut.

3.2 CUTTING AND DRILLING

A. Do not drill or cut structural members without prior permission from Architect.
3.3 WET AND DAMP LOCATIONS

A. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1-inch off wall.

3.4 ROOFTOP SUPPORTS

A. Consult roofing manufacturer for roof membrane compression capacities. If necessary, provide a compatible sheet of roofing material (rubber pad) under rooftop support to disperse concentrated loads and add further membrane protection.

B. Do not use supports that will void roof warranty.

C. Install supports per manufacturers instructions and recommendations.

D. Use properly sized clamps to suit conduit sizes.

E. Install supports for rooftop raceways to raise raceways a minimum of 4-inches above the roof structure unless otherwise noted.

3.5 FABRICATION - MISCELLANEOUS METALS

A. General: Verify dimensions prior to fabrication. Form metal items to accurate sizes and configurations as indicated on Drawings and otherwise required for proper installation; make with lines straight and angles sharp, clean and true; drill, countersink, tap, and otherwise prepare items for connections with work of other trades, as required. Fabricate to detail of structural shapes, plates and bars; weld joints where practicable; provide bolts and other connection devices required. Include anchorages; clip angles, sleeves, anchor plates, and similar devices. Hot dipped galvanize after fabrication items installed in exterior locations. Set accurately in position as required and anchor securely to building construction. Construct items with joints formed for strength and rigidity, accurately machining for proper fit; where exposed to weather, form to exclude water.

B. Finishes:

1. Ferrous Metal: After fabrication, but before erection, clean surfaces by mechanical or chemical methods to remove rust, scale, oil, corrosion, or other substances detrimental to bonding of subsequently applied protective coatings. For metal items exposed to weather or moisture, galvanize in manner to obtain G90 zinc coating in accordance with ASTM A123. Provide other non-galvanized ferrous metal with one coat of approved rust-resisting paint primer, in manner to obtain not less than 1.0 mil dry film thickness. Touch-up damaged areas in primer with same material, before installation. Apply zinc coatings and paint primers uniformly and smoothly; leave ready for finish painting as specified elsewhere.
2. Metal in contact with Concrete, Masonry and Other Dissimilar Materials: Where metal items are to be erected in contact with dissimilar materials, provide contact surfaces with coating of an approved zinc-chromate primer in manner to obtain not less than 1.0 mil dry film thickness, in addition to other coatings specified in these specifications.

3. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION
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SECTION 26 05 33
RACEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:

1. Rigid Metal Conduit (RMC)
2. Intermediate Metal Conduit (IMC)
3. Electrical Metallic Tubing (EMT)
4. Flexible Metal Conduit (FMC)
5. Liquidtight Flexible Metal Conduit (LFMC)
6. Electrical Polyvinyl Chloride (PVC) Conduit
7. Conduit Fittings

B. Provide a complete system of conduit and fittings, with associated couplings, connectors, and fittings, as shown on drawings and described in these specifications.

1.2 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 29, Hangers and Supports for Electrical Systems and Equipment
2. Section 26 05 34, Boxes

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Rigid Metal Conduit (RMC):

1. Allied Tube & Conduit
2. Beck Manufacturing Inc.
3. Picoma
4. Wheatland Tube Company
5. Or approved equivalent.

B. Intermediate Metal Conduit (IMC):

1. Allied Tube & Conduit
2. Beck Manufacturing WL
3. Picoma
4. Wheatland Tube Company
5. Or approved equivalent.

C. Electrical Metallic Tubing (EMT):

1. Allied Tube & Conduit
2. Beck Manufacturing WL
3. Picoma
4. Wheatland Tube Company
5. Or approved equivalent.

D. Flexible Metal Conduit (FMC):
   1. AFC Cable Systems Inc.
   2. Electri-Flex Company
   3. International Metal Hose
   4. Or approved equivalent.

E. Liquidtight Flexible Metal Conduit (LFMC):
   1. AFC Cable Systems Inc.
   2. Electri-Flex Company
   3. International Metal Hose
   4. Or approved equivalent.

F. Electrical Polyvinyl Chloride (PVC) Conduit:
   1. AFC Cable Systems Inc.
   2. Electri-Flex Company
   3. International Metal Hose
   4. PW Pipe
   5. Or approved equivalent.

G. Conduit Fittings:
   1. Bushings:
      a. Insulated Type for Threaded Rigid IMC Conduit Without Factory Installed Plastic Throat Conductor Protection:
         1) Thomas & Betts 1222 Series
         2) O-Z Gedney B Series
3) Or approved Equivalent.

2. Insulated Grounding Type for Threaded Rigid IMC Conduit:
   a. O-Z Gedney BLG Series
   b. Or approved Equivalent.

3. Expansion/Deflection Fittings:
   a. EMT, O-Z Gedney Type TX
   b. RMC, O-Z Gedney Type AX, DX and AXDX, Crouse & Hinds XD
   c. Or approved equivalent.

2.2 RIGID METAL CONDUIT (RMC)
   A. UL 6, ANSI C80.1. Hot dipped galvanized steel conduit after thread cutting.
      1. Fittings: NEMA FB2.10.

2.3 INTERMEDIATE METAL CONDUIT (IMC)
   A. UL6, ANSI C80.6. Hot dipped galvanized after thread cutting.
      1. Fittings: NEMA FB2.10.

2.4 ELECTRICAL METALLIC TUBING (EMT)
   A. Description: UL 797, ANSI C80.3; steel galvanized tubing.
   B. Fittings: NEMA FB 1; steel, set screw type.

2.5 FLEXIBLE METAL CONDUIT (FMC)
   A. Description: UL 1, Interlocked steel construction.
   B. Fittings: NEMA FB 2.20.

2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)
   A. Description: UL 360, inner core made from spiral wound strip of heavy gauge, hot
dipped galvanized low carbon steel. 3/8 through 1-1/4-inch trade sizes have a square
lock core and contain an integral bonding strip of copper. 1-1/2-inch and larger have
fully interlocked core. Jacket material is moisture, oil and sunlight resistant flexible PVC.

B. Fittings: NEMA FB 2.20.

2.7 ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: UL 651, NEMA TC 2; Schedule 40 PVC.

B. Fittings: NEMA TC 3.

2.8 CONDUIT FITTINGS

A. Bushings:

1. Insulated type for threaded rigid IMC conduit without factory installed plastic throat conductor protection.

2. Insulated grounding type for threaded rigid IMC conduit.

B. Raceway Connectors and EMT Couplings:

1. Steel connectors, couplings, and conduit bodies, with hot-dip galvanized.

2. Connector locknuts are steel, with threads meeting ASTM tolerances. Locknuts are hot-dip galvanized.

3. Connector throats (EMT, flexible conduit, metal clad cable and cordset connectors) have factory installed plastic inserts permanently installed. For normal cable or conductor exiting angles from raceway, the cable jacket or conductor insulation bears only on plastic throat insert.

4. Steel gland, Tomic or Breagle connectors and couplings are recognized for this Contract as having acceptable raceway to fitting electrical conductance.

5. Set screw connectors and couplings, without integral compression glands, are recognized for this contract as not having acceptable raceway to fitting electrical conductance. A ground conductor sized per this Specification must be included and bonded within raceway assembly utilizing this type connector or coupling.

C. Provide expansion/deflection fittings for EMT.
PART 3 - EXECUTION

3.1 SEQUENCING AND SCHEDULING

A. Raceway system is defined as consisting of conduit, tubing, duct, and fittings including but not limited to connectors, couplings, offsets, elbows, bushings, expansion/deflection fittings, and other components and accessories. Complete electrical raceway installation before starting the installation of conductors and cables.

B. Finished Surfaces: Schedule raceway installation to avoid conflict with installed wall and ceiling surfaces. If unavoidable, coordinate work and repairs with Architect.

3.2 CONDUIT REQUIREMENTS

A. Conduit Size:

1. Minimum Size: 3/4-inch for power and control, unless otherwise noted. 3/4-inch for communication/data, unless otherwise noted. 1/2-inch for signal systems, unless otherwise noted.

B. Underground Installations:

1. More than 5-feet feet from Foundation Wall: Use PVC.

2. Within 5-feet feet from Foundation Wall: Use PVC.

3. In or Under Slab on Grade: Use PVC.


C. Outdoor Locations Above Grade: Use RMC.

D. In Slab Above Grade:

1. Use RMC.

2. Maximum Size Conduit in Slab: Contact Structural Engineer for maximum outside diameter of conduit.

E. Damp Locations: RMC up to 2-inches in diameter.

F. Dry Locations:

1. Concealed: Use EMT.

2. Exposed: Use EMT.
G. Dry, Protected: EMT.

H. In areas exposed to severe mechanical damage: RMC.

I. For security conduits installed exposed and subject to tampering: RMC.

J. In hazardous areas per CEC 501: RMC.

K. Provide two pull strings/tapes in empty conduits. Types:

1. Utility Company Conduit: Polyester measure/pulling tape, Greenlee 4436 or approved equivalent. Coordinate exact requirements with utility company.

2. Feeders: Polyester measure/pulling tape, Greenlee 4436.


4. If fish tape is used for pulling line or low voltage wiring, fiberglass type to be used. Metal fish tapes will not be allowed.

5. Secure pull string/tape at each end.

6. Provide caps on ends of empty conduit to be used in future.

7. Label both ends of empty conduits with location of opposite end.


M. For Dry Areas: Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.

N. Motors and equipment connections subject to movement or vibration and subjected to any of following conditions; exterior location, moist or humid atmosphere, water spray, oil, or grease use PVC coated liquidtight flexible metallic conduit.

3.3 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Plan locations of conduit runs in advance of the installation and coordinate with ductwork, plumbing, ceiling and wall construction in the same areas.

C. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, and walls. Penetrations are acceptable only when the following occurs:
1. Where shown on the structural drawings.

2. As approved by the Structural Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.

D. Verify routing and termination locations of conduit prior to rough-in.

E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.4 INSTALLATION

A. Install raceways securely, in neat and workmanlike manner, as specified in NECA 1, Standard Practices for Good Workmanship in Electrical Construction.

B. Install steel conduit as specified in NECA 101, Standard for Installing Steel Conduits.

C. Install nonmetallic conduit in accordance with manufacturer's instructions.

D. Inserts, anchors and sleeves.

1. Coordinate location of inserts and anchor bolts for electrical systems prior to concrete pour.

2. Coordinate location of sleeves with consideration for other building systems prior to concrete pour.

E. Conduit Supports:

1. Arrange supports to prevent misalignment during wiring installation.

2. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

3. Group related conduits; support using conduit rack. Construct rack using steel channel. Provide space on each for 25 percent additional conduits.

4. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

5. Do not attach conduit to ceiling support wires.

F. Flexible steel conduit length not-to-exceed 6-feet, 3-feet in concealed walls. Provide sufficient slack to reduce the effect of vibration.
G. Install conduit seals at boundaries where ambient temperatures differ by 10 degrees F or more as shown on the drawings. Install seals on warm side of partition.

H. Seal raceways penetrating an exterior building wall to prevent moisture and vermin from entering into the electrical equipment.

I. Use suitable caps on spare and empty conduits to protect installed conduit against entrance of dirt and moisture.

J. Only conduit servicing elevator equipment can be installed through elevator shafts or equipment rooms. These conduits may only enter the room and go directly to the equipment being supplied.

K. Keep 277/480 volt wiring independent of 120/208 volt wiring, and power wiring. Keep power wiring independent of communication system wiring.

L. Installation of conduit in structural concrete that is less than 3-inches thick is prohibited without the approval of the Structural Engineer. Maintenance pads, and curbs are exempted.

M. Raceways Embedded in Floor Slabs:

1. Do not install raceways in slab without the approval of the Structural Engineer.

2. Do not let raceways interfere with placement of floor slab reinforcement components.

3. Install raceways between the upper and the lower layers of reinforcing steel.

4. Space raceways not less than 8-inches on centers except where they converge at panels or junction boxes.

5. Raceways running parallel to slabs supports, such as beams, columns and structural walls, to be installed not less than 12-inches from such supporting elements.

6. Branch circuit homeruns are not permitted in slab, route branch circuit homeruns above grade exposed in approved areas or above lay-in ceiling spaces.

7. Route conduits in or under slabs point-to-point.

8. Do not cross conduits in slab.

9. Encase medium voltage feeder conduits using red concrete.
N. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal PVC conduit joints with solvent cement and metal conduit with metal thread primer. Rigid conduit connections to be threaded, clean and tight (metal to metal). Threadless connections are not permitted for RMC and IMC. Seal conduits where penetrating below raised floor area.

O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

P. Arrange conduit to maintain headroom and present neat appearance.

Q. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors, unless otherwise noted on drawings.

R. Exposed conduits are permitted only in following areas:

1. Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished material.

2. Existing walls that are concrete or block construction.

3. Where specifically noted on Drawings.

4. Route exposed conduit parallel and perpendicular to walls, tight to finished surfaces and neatly offset into boxes.

S. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block area passage's intended usage.

T. Install continuous conduit and raceways for electrical power wiring and signal systems wiring.

U. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

V. Maintain adequate clearance between conduit and piping.

W. Keep conduits a minimum of 12-inches away from steam or hot water radiant heating lines (at or above 104 degrees F) or 3-inches away from waste or water lines.

X. Cut conduit square using saw or pipecutter; deburr cut ends.

Y. Bring conduit to shoulder of fittings; fasten securely.

Z. Use conduit hubs to fasten conduit to cast boxes in damp and wet locations.
AA. Install no more than the equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate factory elbows for bends in metal conduit larger than 2-inch size.

AB. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

AC. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.

AD. Conduit Terminations for Signal Systems: Provide a plastic bushing on the end of conduit used for signal system wiring.

AE. Flexible Conduit: Install 12-inch minimum slack loop on flexible metallic conduit and liquidtight flexible metallic conduit.

AF. Feeders: Do not combine or change feeder runs.

3.5 CONDUIT FITTINGS

A. Use set screw type fittings only in dry locations. When set screw fittings are utilized provide insulated continuous equipment ground conductor in conduit, from overcurrent protection device to outlet.

B. Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2-inches in diameter.

C. Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes that have feeders 60 amperes and greater.

D. Condulets and Conduit Bodies:

1. Do not use condulets and conduit bodies in conduits for signal wiring or in feeders 100 amp and larger.

2. Do not use condulets and conduit bodies.

E. Sleeves and Chases - Floor, Ceiling and Wall Penetrations: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceilings or walls.

F. Expansion Joints:
1. Provide conduits crossing expansion joints where cast in concrete with expansion-deflection fittings, equivalent to OZ/Gedney AXDX, installed per manufacturers recommendations.

2. Secure conduits 3-inches and larger to building structure on opposite sides of a building expansion joint with an expansion-deflection fitting across joint installed per manufacturer’s recommendations.

3. Provide conduits less than 3-inches where not cast in concrete with junction boxes securely fastened on both sides of expansion joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits 3-inch and larger may be installed.

4. Verify expansion/deflection requirements with Structural Engineer prior to installation.

G. Seismic Joints:

1. No conduits cast in concrete allowed to cross seismic joint.

2. Provide conduits with junction boxes securely fastened on both sides of seismic joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. Prior to installation, verify with Architect that 15-inches is adequate for designed movement, and if not, increase this length as required.

3. Provide conduits less than 3-inches where not cast in concrete with junction boxes securely fastened on both sides of expansion joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits 3-inch and larger may be installed.

H. Provide rigid conduit coupling flush with surface of slab or wall for conduit stubbed in concrete slab or wall to serve electrical equipment or an outlet under table or to supply shop tool, etc. Provide plug where conduit is to be used in future.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.
B. Route conduit through roof openings for piping and ductwork wherever possible. Where separate roofing penetration is required, coordinate location and installation method with roofing installation and installer.

END OF SECTION
SECTION 26 05 34

BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:
   1. Outlet Boxes
   2. Pull and Junction Boxes
   3. Box Extension Adapter
   4. Conduit Fittings
   5. Weatherproof Outlet Boxes

B. Provide electrical boxes and fittings for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts and other necessary components.

1.2 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:
   1. Section 26 05 33, Raceways
   2. Section 26 05 53, Identification for Electrical Systems

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Outlet Boxes:
   1. Bowers
   2. Hubbell
   3. Raco
   4. Steel City
   5. Thomas & Betts
   6. Or approved equivalent.

B. Pull and Junction Boxes:
   1. B-Line
   2. Hoffman
   3. Or approved equivalent.

C. Box Extension Adapter:
   1. Bell
   2. Carlon
   3. Raco
   4. Red Dot
5. Steel City
6. Thomas & Betts
7. Or approved equivalent.

D. Conduit Fittings:
   1. Killark
   2. O-Z Gedney
   3. Raco
   4. Steel City
   5. Thomas & Betts
   6. Or approved equivalent.

E. Weatherproof Outlet Boxes:
   1. Pass and Seymour
   2. Bell
   3. Red Dot
   4. Carlon
   5. Or approved equivalent.

2.2 OUTLET BOXES

A. Luminaire Outlet: 4-inch octagonal box, 1-1/2-inches deep with 3/8-inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.

B. Device Outlet: Installation of one or two devices at common location, minimum 4-inches square, minimum 1-1/2-inches deep. Single- or two-gang flush device raised covers.

C. Telecom Outlet: Provide 5-inches square, minimum 2-7/8-inch deep box with single-gang plaster ring and 1-1/4-inch conduit.

D. Multiple Devices: Three or more devices at common location. Install one-piece gang boxes with one-piece device cover. Install one device per gang.
E. Masonry Boxes: Outlets in concrete.

F. Construction: For interior locations, provide galvanized steel outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.

G. Accessories: Provide outlet box accessories for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

H. Noise Control: Provide acoustic putty pad to back side of each outlet box installed in acoustic rated walls.

2.3 PULL AND JUNCTION BOXES

A. Construction: Provide ANSI 49 gray enamel painted sheet steel junction and pull boxes, with screw-on covers; of type shape and size, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

B. Location:

1. Provide junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.

2. Provide junction boxes and pull boxes to facilitate installation of conductors and limiting accumulated angular sum of bends between boxes, cabinets and appliances to 270 degrees.

2.4 BOX EXTENSION ADAPTER

A. Construction: Diecast aluminum.

B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment. Bell 940 Series, Red Dot IHE4 Series.

2.5 CONDUIT FITTINGS

A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.
2.6 WEATHERPROOF OUTLET BOXES

A. Construction: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal faceplate with spring-hinged waterproof cap suitably configured for each application, including faceplate, gasket, blank plugs and corrosion proof fasteners. Weatherproof boxes to be constructed to have smooth sides, gray finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify locations of boxes and outlets in offices and work areas prior to rough-in.

3.2 INSTALLATION

A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1, Standard Practice of Good Workmanship in Electrical Construction.

B. Secure boxes rigidly to substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.

C. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.

D. Set wall mounted boxes at elevations to accommodate mounting heights specified in this Section.

E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.

1. Adjust box locations up to 5-feet if required to accommodate intended purpose.

F. Mount center of outlet boxes, unless otherwise required by ADA, or noted on drawings, following distances above floor:

1. Control Switches:
   a. 48-inches.
   b. 4-inches above top of backsplash at countertops/workstations, not-to-exceed 46-inches above finished floor per ADA requirements.

2. Receptacles: 18-inches.

4. Other Outlets: As indicated in other Sections of specifications or as detailed on drawings.

G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6-inches from ceiling access panel or from removable recessed luminaire.

I. Flush Outlets in Insulated Spaces: Maintain integrity of insulation and vapor barrier.

J. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.

K. Coordinate electrical device locations and elevations (switches and receptacles) with architectural drawings to prevent mounting devices in mirrors, back splashes, and behind cabinets.

L. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices. Adjacent boxes not aligned vertically to be adjusted at no additional cost to Owner.

N. Use flush mounting outlet box in finished areas.

O. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

P. Do not install flush mounting box back-to-back in walls; provide minimum 6-inches separation. Provide minimum 24-inches separation in acoustic rated walls.

Q. Apply acoustic putty pad on outlet box prior to installation of acoustical blanket.

R. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

S. Use stamped steel bridges to fasten flush mounting outlet box between studs.

T. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

U. Use adjustable steel channel fasteners for hung ceiling outlet box.

V. Do not fasten boxes to ceiling support wires.
W. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12-inches of box.

X. Use gang box where more than one device is mounted together. Do not use Sectional box.

Y. Use gang box with plaster ring for single device outlets.

Z. Use cast outlet box in exterior locations exposed to the weather and wet locations.

AA. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.

AB. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

AC. Box Color Coding and Marking: Reference Section 26 05 53, Identification for Electrical Systems.

3.3 ADJUSTING

A. Adjust floor boxes flush with finish flooring material.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Adjust boxes to be parallel with building lines. Boxes not plumb to building lines are not acceptable.

D. Install knockout closures in unused box openings.

3.4 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
A. Work included: Provision of materials, installation and testing of:
   1. Nameplates and Labels
   2. Device Labels
   3. Wire Markers
   4. Conduit Markers

1.2 RELATED SECTIONS
A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS
A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS
A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
B. In addition, provide:
   1. Samples of Nameplates/Labels: One of each type.

1.5 QUALITY ASSURANCE
A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
B. In addition, meet the following:
   1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.
2. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices unless otherwise indicated.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 26, Electrical Sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Equipment Nameplates:
   1. B & I Nameplates
   2. Intelicum
   3. JBR Associates
   4. Or approved equivalent.

C. Device Labels:
   1. Kroy
   2. Brady
   3. Or approved equivalent.

D. Wire Markers:
   1. Brady
   2. Panduit
   3. Sumitomo
   4. Or approved equivalent.
E. Conduit Markers:

1. Allen Systems
2. Brady
3. Or approved equivalent.

2.2 NAMEPLATES AND LABELS

A. Nameplates: Engraving stock melamine or lamicoid plastic laminate in the size and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color), punched for mechanical fastening except where adhesive mounting is necessary because of substrate. Provide 1/8-inch thick material.

4. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
5. Access Panel Markers: Manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve or devices/equipment. Include center hole to allow attachment.
6. Locations:
   a. Each electrical distribution and control equipment enclosure.
   b. Communication cabinets.

B. Labels: Adhesive tape, with 3/16-inch black letters on clear background. Use only for identification of individual wall switches and receptacles. Indicate device name, source panel, and source circuits. Panel and circuit designation written in permanent marker on the back of the plate and inside the back-box. Do not provide Dymo tape style labels.

C. Device plates to have panel and circuit designation engraved in face, and highlighted in a contrasting color, and the circuit written in permanent marker on the back of the plate and inside the back-box.
2.3 DEVICE LABELS

A. Extra strength, laminated, adhesive tape, with 3/16-inch black letters on clear background. Use only for identification of individual wall switches, receptacles, control device stations, etc. Indicate source panel and circuits. Wall switches with engraved buttons do not require labeling. Embossed tape style labels, or similar, are not acceptable.

B. Label all junction boxes to show system identification, source circuit, or raceway origin. In finished areas, utilize device label. In unfinished areas or above ceilings, use of permanent ink marker is acceptable.

C. Where labels are provided, write identical information in permanent ink marker on the backside of the cover.

2.4 WIRE MARKERS

A. Description: Vinyl-cloth self-adhesive type wire markers.

B. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, junction boxes, and each load connection.

C. Power and Lighting Circuits: Branch circuit or feeder number as indicated on drawings and source panel.

2.5 CONDUIT MARKERS

A. Description:

1. Self-sticking vinyl.

B. Location: Furnish markers for each conduit longer than 6-feet.

C. Spacing: 20-feet on center.

D. Color:

1. 480 Volt System: Per College Standards.

2. 208 Volt System: Per College Standards.


4. Telephone System: Per College Standards.
PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates.
B. Coordinate designations used on Drawings with equipment labels.

3.2 INSTALLATION

A. Install nameplates and labels parallel to equipment lines.
B. Secure nameplates to equipment front using self-tapping stainless steel screws.
C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
D. Identify empty conduit and boxes with intended use.
E. Provide wire markers on each conductor for power, control, signalling and communications circuits.
F. On the back of receptacle and switch finish plates and inside the back-box, legibly write with permanent ink marker, the circuit that each device is connected to.
G. On the front of receptacle and switch finish plates, provide label with the circuit that each device is connected to.
H. Locations:
   1. Switchgear, switchboards, sub-distribution switchboards, distribution panels, and branch panels.
   2. Main breakers and distribution breakers in switchgear, switchboards, and distribution panels.
   3. Equipment including, but not limited to, motor controllers, disconnects, and VFD's.
   4. Low-voltage equipment enclosures including, but not limited to, fire alarm panels, and lighting control panels.
I. Provide nameplates for flush mounted branch panelboards identifying name on front door. On inside of door provide nameplate as noted above.
J. Provide a second label at branch panelboards listing the means of identification of branch circuit conductors. This identification legend to consist of the color code used for each voltage system (208Y/120V and 480Y/277V). See specification Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables, for required conductor color code for this project. Include identification of both voltage systems on each label, regardless of the voltage of the panelboard to which the label is affixed. Comply with requirements of NEC 210.5.

K. Provide engraved nameplate similar to distribution panelboards for transformers, lighting control panels, contactors, relays, time switches, etc. identifying name, service point and circuit number.

L. For flush mounted panelboards verify label location (inside or outside panelboard door) with Architect/Owner.

M. Provide typewritten branch panel schedules with protective clear transparent covers accounting for every breaker installed. Use actual room designations assigned by name or number near completion of the work, and not the designations shown on drawings.

N. Where changes are made in existing panels, distribution boards, etc., provide new labeling and typewritten schedules to accurately reflect the changes.

O. Provide labeling where switches control remote lighting or power outlets or where multiple switches are located in the same location.

P. Where switches control remote lighting or power outlets, or where switches or outlets in same location serve different purposes, such as light, power, intercom, etc. or different areas, such as corridor and outside, plates with 1/8-inch black letters indicating function of each switch or outlet. Also label function light switches where two or more are mounted in same locations.

END OF SECTION
SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY
A. Work Included: Provision of materials, installation and testing of:
   1. Wall Switches
   2. Receptacles
   3. Finish Plates
   4. Surface Covers

1.2 RELATED SECTIONS
A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS
A. References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
B. In addition, meet the following:
   1. UL 498, Attachment Plugs and Receptacles.
   2. UL 943, Ground Fault Circuit Interrupters (Class A GFCI).

1.4 SUBMITTALS
A. Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
B. In addition, provide:
   1. Wall switches
   2. Receptacles
3. Wall Plates

C. Submit performance test results for devices in patient care areas in conformance with NFPA 99-4.3.3.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wall Switches:

1. Toggle Type Characteristics:
   a. Leviton 1221
   b. Pass & Seymour PS20AC1
   c. Hubbell HBL 1221
   d. Or approved equivalent.

B. Receptacles:

1. Industrial Grade:
   a. Cooper 5362
   b. Hubbell HBL5362
   c. Bryant FRY5362
   d. Leviton 5362
   e. Pass & Seymour 5362A
   f. Or approved equivalent.
2. Commercial Grade - 20 Amp:
   a. Cooper 5362
   b. Hubbell 5362
   c. Bryant 5352
   d. Leviton 5362S
   e. Pass & Seymour 5362
   f. Or approved equivalent.

3. Ground Fault Circuit Interrupter (GFCI) Receptacle:
   a. Hubbell GFR5362SB
   b. Cooper WRVGF20
   c. Pass & Seymour 2095TRWR
   d. Or approved equivalent.

C. Surface Covers:

1. Aluminum with Gasket, Blanks, Single Gang:
   a. Bell 240-ALF
   b. Carlon
   c. Or approved equivalent.

2. 2-Gang:
   a. Bell 236-ALF
   b. Carlon
   c. Or approved equivalent.

D. Provide lighting switches and receptacles of common manufacturer and appearance.
2.2 WALL SWITCHES

A. Characteristics: Toggle type, quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage, extra heavy duty.

B. Finish: Match Building Standard.

2.3 RECEPTACLES

A. Duplex Receptacles Characteristics: Straight parallel blade, 125 volt, 2 pole, 3 wire grounding, decorative type.
   1. Decorative Type: Back and side wired. 20 amp.

B. Ground Fault Circuit Interrupter (GFCI) Receptacle: Feed through type, back-and-side wired, tamper-resistant, weather resistant self-testing, 20 amp, 125VAC.


D. Finish:
   1. Same exposed finish as switches.
   2. Receptacles connected to emergency circuits life safety and critical to have red finish.
   3. Receptacles installed in surface raceway to match raceway finish. See Section 260533, Raceways.
   4. Receptacles connected to isolated ground to have orange finish.

2.4 FINISH PLATES

A. Finish Plates: Match building standard.

B. Provide telephone/signal device plates; activated outlets to have coverplates to match modular jack.

C. Provide emergency devices with factory engraved "Emergency."

2.5 SURFACE COVERS

A. Material: Galvanized steel, 1/2-inch raised industrial type with openings appropriate for devices installed on surface outlets.

B. Cast Box and Extension Adaptors: Aluminum with gasket, blanks single gang or 2-gang.
PART 3 - EXECUTION

3.1 PREPARATION

A. Protection:

1. Devices: Upon installation of finish plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of substantial completion, replace those items which have been damaged, including those burned and scored by faulty receptacles or cord caps.

2. Finish Plates and Devices: Do not install items until finish painting is complete. Scratched or splattered finish plates and devices not acceptable.

3.2 INSTALLATION

A. See Architectural elevations for location and mounting height of wiring devices. Review Architectural elevations prior to rough-in and contact Architect immediately if conflicts are found between Architectural and Electrical Drawings. Do not rough-in devices until conflicts are resolved.

B. Install wiring devices and finish plates plumb with building lines, equipment cabinets and adjacent devices. Devices not plumb will be fixed at no additional cost to Owner.

C. Orientation:

1. Wall-Mounted Receptacles: Install with long dimension oriented vertically at centerline height shown on drawings or as specified.

2. Vertical Alignment: When more than one outlet is shown on drawings in close proximity to each other, but at different elevations, align outlets on a common vertical center line for best appearance. Verify with Architect.

3. Horizontal Alignment: When more than one outlet is shown on Drawings to be stacked in wall vertically, align outlets on a common horizontal center line for best appearance. Verify with Architect.

D. GFCI Outlets: One GFCI receptacle may not be used to provide GFCI protection to downstream duplex receptacles on same branch circuit.

E. Provide 20 amp rated duplex receptacle in conditions where there is only one duplex receptacle on a 20 amp branch circuit.

F. Provide orange coverplates on isolated ground receptacles.
G. Provide tamper resistant receptacles in pediatric units, emergency department, waiting areas and outpatient waiting areas and public areas where children may be momentarily unattended.

3.3 LABELING

A. Provide labeling per Section 26 05 53, Identification for Electrical Systems.

B. Provide receptacle device plates with panel and circuit designation labeled on the face, with Dymo-type label, and with circuit written in permanent marker on back of plate and back-box. Provide switch device plates with panel and circuit designation written in permanent marker on back of plate and back-box.

END OF SECTION
SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes:

1. Excavation including removal of known on- or below-grade construction or obstructions, and filling and backfilling.

2. Provision of rock courses, sand beds, and vapor retarders under slabs on grade.

B. Related Sections:

1. Section 02 41 00 - Demolition.

C. Definitions:

1. Compaction: Ratio expressed as percentage of dry density of material compacted in field to maximum dry density of same material as determined by ASTM D1557.

2. Existing Topsoil: Soil containing no more than 5-percent by volume of organic matter as determined by the Owner's Soils Engineer.

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply unless otherwise noted).


4. State of California, Business and Transportation Agency, Department of Public Works, Division of Highways:


1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Work shall comply with rules and regulations of local and State agencies having jurisdiction.

2. State and local code requirements shall control disposal of debris.

B. Allowable Tolerances:

1. Excavations shall not exceed 1/10-foot variation from dimensions and elevations shown or noted.

2. Fill and backfill shall be placed within tolerance of plus or minus 1/10-foot.

1.4 JOB CONDITIONS

A. Existing Conditions:

1. Carefully maintain bench marks, monuments, and survey control references.

2. Verify or determine locations of underground utilities and avoid damage. Should damage occur, notify the Architect and repair at no additional cost to the Contract.

3. Restore grades disturbed by construction activity or other causes to elevations shown or noted.

B. Environmental Requirements: When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion. After interruption, re-establish compaction specified in last layer before resuming work.

C. Protection: Conduct earthwork operations so as to prevent windblown dust and dirt from interfering with the Owner's and adjacent property owner's normal operations. Assume liability for all claims related to windblown dust and dirt. Protect building structures and adjacent surfaces to remain.

D. Sequencing: Sequence operations so as to maintain safe working conditions and preserve existing Work which is to remain.

E. Layout: If any discrepancies are found by Surveyor between Drawings and actual conditions at Site, Architect reserves right to make such minor adjustments in Work
specified hereunder, as are necessary to accomplish the intent of the Contract Documents, at no increase in Contract price.

1.5 RESPONSIBILITY FOR ACCURACY OF SITE DATA

A. The Contractor shall promptly, and before such condition is disturbed, notify the Architect in writing of soil or subsurface conditions which differ materially from those conditions shown in the Contract Documents or in the records of investigations of soil or subsurface conditions referred to above. The Architect shall promptly investigate the conditions. If he finds the conditions materially different from those which reasonably should have been anticipated on the basis of a careful consideration of said records of investigations, logs of borings and examination of the site, and finds that said conditions will cause an increase or decrease in the cost of, and/or the time required for performance of the Contract, he will, after approval by the Owner, modify the Contract Terms in writing to provide for an equitable adjustment in cost and/or time of performance. Any claim of the Contractor shall not be allowed unless he has given the required written notice.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Typical Fill and Backfill:

1. Granular, not showing excessive shrinkage or swelling when subjected to changes in water content.

2. Free of organic matter, concrete or brick fragments and other deleterious substances and containing no rocks or lumps over 4-inches in greatest dimension.

3. All fill material shall be within 3-percent of optimum moisture content as determined by ASTM D1557.

4. On-site soils may be used as fill material except where granular fill material is specified. The moisture content must be within the above limits to be acceptable. Some drying of on-site soils may be required.

5. Conform to the following minimum requirements:


c. Maximum Plasticity Index: 12. Values at an exudation pressure of 400 psi as determined by CMM Test Method No. 301 D.

B. Granular Backfill: ASTM C33 fine aggregate or relatively clean (less than 8 percent by weight passing No. 200 sieve) bank run sand and gravel.
C. Rock Course:

1. Clean mineral aggregate (broken stone, crushed or uncrushed gravel, clean quarry waste, or combination thereof).

2. Free of adobe, organic matter, loam, volcanic tuff, or other deleterious material.

3. Absorption of water in saturated surface dry condition shall not exceed three percent of oven dry weight of sample.

4. Graded (Laboratory sieves, U. S. Series) to following:

<table>
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<tr>
<th>Sieve Size</th>
<th>Percentage Passing Sieve</th>
</tr>
</thead>
<tbody>
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<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
</tr>
</tbody>
</table>

D. Sand: Clean dry concrete sand of no special grading or compaction.

E. Vapor Retarder: Minimum 15 mil polyethylene sheet, decay-resistant material per ASTM E1745 Class C. Provide over-prepared base material below slabs-on-grade where indicated.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall be deemed to have inspected site and informed himself of actual grades, levels, and other conditions under which Work is to be performed.

3.2 EXCAVATION

A. General Requirements:

1. Excavate to dimensions and elevations shown or noted with bottoms square and true.

2. Remove debris, old foundations, tree stumps, and loose rocks from bottom of excavation.

3. Shore, brace, sheet, and slope excavations as required to prevent caving, erosion, danger to persons and structures, or interference with construction operations and as required to comply with safety laws.

4. Keep excavation free of water at all times until concrete work and backfilling is complete. Grade excavated areas to provide drainage to prevent ponding of water.
B. Excavated Soil Material: All excavated material determined unsuitable for use as fill or backfill or in excess of backfill requirements shall be removed from the site.

C. Provisions for Formwork Construction:

1. Extend excavations sufficient distance from walls and footings to permit placing and removal of forms, installation of services and inspection.

2. Trim excavation walls and bottoms to reasonably smooth lines and grades.

D. Earth Forms: The Contractor may excavate to dimensions of footing required in order to avoid constructing formwork, provided excavations are clean cut and free of spaces or cave-ins and provided the Owner's Soils Engineer approves. Continuous trenching for individual footings will not be permitted.

E. Over-Depth Excavations: Rebuild to grade with lean concrete conforming to 1909A as directed by the Owner's Soils Engineer.

F. Topsoil: Strip top 6-inches of topsoil. The Contractor shall stockpile top topsoil on the site as directed.

G. Removal of On- or Below-Grade Construction or Obstructions:

1. Remove known existing construction or obstructions including wells, vaults, walls, or otherwise enclosed spaces wherever they occur below new grade within immediate areas of new construction, new paving or new planted areas.

H. Reworking of Holes, Depressions, Softened, or Disturbed Areas:

1. Cut out the hole, depression, or unsuitable soil area to workable "cat" width or wider by use of "cat and blade" or similar means, cutting to firm subgrade at the bottom and sides.

2. Compact the subgrade as specified hereinbefore.

3. Fill as specified for structural backfill. "Hook" into the side of the excavation as each lift or fill is spread, as far as may be required to reach firm soil at the sides of the excavation and to bond new fill into the existing soil.

4. Fill excavation in manner specified hereinbefore until a surface is obtained which is even and continuous with adjoining grade and offers a firm, even subgrade for final usage or placement of additional fill thereon.
I. Dewatering:

1. Provide, operate, and remove dewatering equipment necessary to drain and keep excavations free of water under all circumstances.

2. Prevent surface water from flowing into excavation; promptly remove any water accumulated.

3. Dewatering system shall remain in place until construction Work below ground-water table is completed.

3.3 FILLING AND BACKFILLING

A. General Requirements:

1. Do not place fill or backfill until forms, rubbish and deleterious materials have been removed, waterproofing measures completed, and areas have been approved by the Architect.

2. Scarify surface of area to receive fill to 6-inch depth and until surface is free from ruts, hummocks or other uneven features. Disc or blade scarify surface until free from large clods.

3. Bring scarified material to proper moisture content and compact to specified density.

4. Spread material in layers not to exceed 8-inch depth before compaction. Sprinkle material with sufficient moisture to compact properly; permit material with excess moisture to dry to proper water content. Thoroughly mix soil and water by blading and discing before compacting.

5. Place granular backfill material as adjacent backfill is being placed.

6. Adequately brace and shore footings, walls, etc., against which backfill is to be placed to prevent displacement or damage during placement. Do not remove shores or braces until permanent supports are in place and have attained their required strength.

7. All fill material should be within 3-percent of optimum moisture contents as determined by ASTM D1557.

B. Minimum Compaction Requirements:

1. Subgrade under interior slabs: 95-percent

2. Subgrade under footings: 95-percent

3. Subgrade under pavements supporting automobile traffic: 95-percent
4. Backfill against walls for full width and height of excavation: 80-percent

5. All other fills: 85-percent

6. Do not compact soil in planting areas.

C. Compacting:

1. Compact by power tamping, rolling or combinations thereof as approved by the Owner’s Soils Engineer. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping. Scarify and recompact any layer not attaining compaction until required density is obtained.

2. Compaction by flooding, ponding or jetting will not be permitted.

3.4 SLAB BASE AND VAPOR RETARDER INSTALLATION

A. Rock Courses:

1. Verify that all improvements such as floor drains are installed; that the Owner’s Soils Engineer has approved rough graded and compacted subgrade.

2. Place nominal 4-inch thick rock course under building slabs.

3. Level and compact to smooth surface.

B. Vapor Retarder Installation: Place vapor retarder sheeting with longest parallel with direction of pour. Lap seams 6” minimum and seal with manufacturer’s recommended tape.

C. Sand Beds:

1. Provide nominal 2-inch thick protective cover of sand over installed moisture barrier under concrete slabs.

2. Screed and level before reinforcing or concrete is placed.

3.5 GRADING

A. Begin grading only after debris and construction materials are removed from area concerned.

B. Grade areas to smooth, level or evenly sloped, uniform surface in conformity to contour lines and spot elevations noted. Make grades level where not otherwise indicated. Round smooth abrupt changes in slopes. Refill to required levels any settled grades. Slope ground away from building walls.

C. Ensure finished grades and surfaces conduct water directly to area drain, gutters, etc.
D. Place stockpiled topsoil in maximum 6-inch lifts to depth indicated. Scarify subgrade to minimum depth of 6-inches and obtain the Architect’s approval before placing topsoil.

E. Prevent erosion of freshly graded areas during construction and until permanent drainage and erosion control measures are installed. At cut slopes, place layer mesh and plant ground cover.

F. After finish grading is completed, perform no further excavation or filling operations except by the Architect’s approval and under observation of the Owner’s Soils Engineer.

3.6 FIELD QUALITY CONTROL

A. The Owner’s Soils Engineer will:
   1. Sample and test fill material from source designated by the Contractor.
   2. Observe site preparation, excavation and placing and compacting of fill and backfill.
   3. Perform tests and inspections deemed necessary to ensure compliance with specifications.
   4. Issue final report to the Owner on grading and certification of compliance with specifications.
   5. Submit verified report to the DSA per CBC Section 1704A.

B. The Contractor shall:
   1. Furnish access to site and facilities for inspection.
   2. Notify the Architect 48-hours prior to any fill or backfill operations.
   3. Pay costs for additional inspections and tests due to noncompliance with Contract Documents.

END OF SECTION
SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included in this Section: Provision for clearing and grubbing as herein defined.

1.2 DEFINITIONS

A. “Clearing” means the picking up, removal, and disposal of above-ground rubbish and debris, vegetation, and structures not otherwise designated for demolition or preservation.

B. “Grubbing” means the dislodging, removal, and disposal of below-ground rubbish and debris, vegetation, facilities, and structures not otherwise designated for demolition or preservation.

1.3 INCORPORATED DOCUMENTS

A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.


PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 GENERAL

A. Areas shown shall be cleared of all materials listed in the definition of “clearing” hereinafter. Items within the area to be cleared, but designated to remain in place, shall be protected from injury or damage.

B. Maintain existing vegetation, indicated to remain, in healthy condition.

C. Retain existing topsoil for backfilling and landscaping upon completion.

3.2 CLEARING

A. Perform clearing operations in advance of excavating, filling, and grading, unless otherwise directed.
3.3 GRUBBING

A. Piping, foundations, and other underground objects known to be in areas to be grubbed are shown.

B. Protect underground facilities not shown encountered during grubbing operations, until it has been determined whether they are active or inactive. Repair damage occurring to active facilities which are indicated to remain, as directed, at no increase in Contract Price.

C. Remove, relocate, or require the performance of extra Work as directed for underground objects not shown but encountered during grubbing operations.

D. Grub to depth shown, or, if not shown, grub to 2-feet below natural- or finish-grade elevation, whichever is lower, or as otherwise specified herein.

1. Remove roots, wood, buried logs, and other unwanted organic material 1½-inches in diameter, or greater. Remove stumps or root masses more than 4-cubic feet in volume to a depth of 4-feet below the natural- or finish-grade elevation, whichever is lower.

2. Remove bituminous pavement, concrete pavement, concrete slabs, columns, foundations, and walls within the designated limits and as specified hereinafter; neatly trim remaining portions.

3. Remove, to the joint or edge, concrete slabs with a construction joint or cold joint, expansion joint, or edge within 3-feet of the exterior Work limits.

3.4 DISPOSAL

A. Legally dispose of cleared and grubbed material off the site.

END OF SECTION
SECTION 32 13 13
SITE CONCRETE WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide Portland cement concrete site work for walks and paving including aggregate bases.

B. Related requirements specified elsewhere include fill and compaction - Section 31 00 00, EARTHWORK.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. City public works standards, for off-site work.

2. State of California, Business and Transportation Agency, Department of Transportation (Caltrans): “Standard Specifications,” except references to “Measurement” and “payment” are not applicable.

3. Reference standards specified in Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Stipulations:

1. Finish Surface Tolerance: 1/4-inch maximum variation in 10 feet.

2. Subgrade: The Project Soils Engineer is to be the Testing Agency and make tests and observe earthwork operations. Give at least 48 hours notice before required field observations and testing.

   a. Review of preparation of areas to receive concrete work.

   b. For subgrade and aggregate base, field density tests per ASTM D1556 or D2922.

   c. Aggregate base material will be tested for suitability and to determine moisture-density relationship per ASTM D1557.

3. The Contractor shall provide mix designs by an approved laboratory, each with sump test and 28 days compression test of trail batch.

4. The Contractor shall provide any additional tests and inspections of off-site work required by City standards.
C. Certifications:

1. Furnish mill certificates for reinforcing steel indicating compliance with the Specifications.

2. Furnish mill certificates for Portland cement indicating compliance with the Specifications.

3. Certify that concrete aggregates comply with the Specifications and are suitable for the intended use.

4. Certify that the aggregate base material complies with the Specifications.

1.3 SUBMITTALS

A. Procedures: In accordance with Division 1.

B. Shop drawings of reinforcing steel.

C. Sample of each type of specified finish, 2 x 2 feet, at the site, for approval of color, texture and joints.

1.4 JOB CONDITIONS

A. Where indicated work is of superior quality or capacity to that required by City standards, the Drawings and Specifications shall take precedence.

B. Where new work abuts existing pavements, abutment shall be clean and straight and the transition shall be smooth and flush. Sawcut existing pavement edge as required.

PART 2 - PRODUCTS

2.1 FORMWORK MATERIALS

A. Forms shall be as specified in Section 03 10 00, CONCRETE FORMING AND ACCESSORIES, or approved metal form systems.

B. Form coatings shall be specified in Section 03 10 00, CONCRETE FORMING AND ACCESSORIES.

2.2 REINFORCING MATERIALS

A. Reinforcing materials shall be as specified in Section 03 20 00, CONCRETE REINFORCING.

2.3 CONCRETE MATERIALS

A. Portland Cement Concrete: Materials shall be as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE except use white cement for mix at integral color B medium sandblast finish.
   1. Color and Texture: Match to existing site work.
C. Wax for Colored Concrete: As recommended by manufacturer of color additive.
   1. Color: Match to existing site work.

2.4 ANCILLARY MATERIALS

A. Aggregate Base: Crushed aggregate, 3/4-inch maximum, conforming to Caltrans Standard Specification 26-1.02B.
C. Curing Compound: Approved water-base type, free of oil, wax or other substance detrimental to subsequently applied finishes; Nox-Crete “Bro-Cure,” or approved equal.
D. Dowels: No. 4 smooth bars.

PART 3 - EXECUTION

3.1 EMBEDDED ITEMS

A. Reinforcement and other embedded items shall be positioned and held securely in place. At time of placing concrete, reinforcing shall be free of excessive rust, mill scale, or other bond reducing matter.

3.2 PREPARATION

A. After underground piping and raceways have been laid, fill and tamp all traces of utility trenches. Relative compaction of not less than 95 percent shall be obtained for a depth of 8 inches or more. Take every precaution to obtain a subgrade of uniform bearing power by compaction to provide a firm base and in accordance with Section 31 00 00, EARTHWORK.
B. Subgrade shall be kept moist as specified in Section 31 00 00 and shall not be allowed to dry out before placement of concrete. Place no material on muddy subgrade.
C. Aggregate base, where indicated, shall be placed and compacted in conformance with Caltrans Standard Specifications 26-1.04 and 26-1.05.

3.3 FORMS

A. Forms shall conform to applicable requirements specified in Section 03 10 00, CONCRETE FORMING AND ACCESSORIES.
B. Curb and pavement edge forms shall extend full depth of concrete. Curves shall be formed with flexible metal or wood made up of thin laminations. Curve forms shall extend one stake space straight beyond tangent point.

C. Maintain form within the following tolerances.

1. Top of Forms: Plus or minus 1/8 inch in 10 feet and no abrupt variations; at required elevation to plus 3/8 inch.

2. Face of Form: Plus or minus 1/4 inch in 10 feet longitudinal and no abrupt variations; perpendicular to surface plus or minus 1/8 inch.

D. Forms may be reused upon cleaning and coating with parting compound to ensure separation from concrete without damage.

E. Forms shall remain in place at least 1 hour after concreting.

3.4 EMBEDDED ITEMS

A. Fabricate and place reinforcement in accordance with reference standards.

B. Embedded items shall be accurately positioned and secured in place.

3.5 CONCRETE MIXES

A. Concrete mixes shall be approved and shall be in accordance with Caltrans Standard Specifications Section 90.

1. Mix for typical Sidewalks: Class "B," 2500 psi, Type II Portland cement and 1 inch maximum aggregate.

3.6 MIXING AND PLACING CONCRETE

3.7 Conform to applicable requirements set forth in State Standards Specifications Section 90.

3.8 JOINTS

A. Plane of pavement joints shall be perpendicular to surface. Line of transverse joints shall be perpendicular to walk center line unless otherwise indicated. Where new walks join existing, joints shall align.

1. Locate expansion joints at 30 feet on center, unless otherwise shown.

2. Extend joint filler full width and depth of the joint, and not less than 1/8 inch or more than 1/4 inch below the finished pavement surface. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required splice at approved locations and lace or clip joint filler sections together.
3. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after both sides of joint are placed.

4. Tool concrete edge both sides of joint.

B. Construction Joints: Place construction joints at the end of pours and at locations where placement operations are stopped for a period of more than one half hour, except where such pours terminate at expansion joints.

1. Grease one side of dowel and install at 3-2/3-0" on center from paving edge.

2. Tool concrete edge both sides of joint.

C. Pavement Score Line: Provide weakened plane joints sectioning the pavement into areas as indicated. Groove the fresh concrete to at least 1/2 inch deep and 3/16 inch wide; tool the concrete both sides of the line.

3.9 FINISHING

A. Conform to applicable requirements set forth in Section 03 30 00.

1. “Broom Finish”: After flatwork concrete has been floated and given a preliminary trowelling in accordance with Specifications Section 03 30 00, the surface shall be uniformly textured with directional scoring by stiff bristle broom, to match approved sample. Unless otherwise indicated, direction of brooming shall be perpendicular to center line of work.

2. “Sandblast Finish”: After smooth formed or steel trowelled concrete is set and cured, the surfaces shall be uniformly etched about 1/16 inch deep for Light Sandblasted areas and 1/8 inch deep for Medium Sandblasted areas, exposing aggregates, to match approved sample.

   a. Use same equipment, grit, pressure and technique as used to make sample.

   b. Perform in as continuous an operation as practicable, utilizing same crew throughout to maintain uniformity and continuity.

   c. Maintain uniform texture at corners and neat edge lines by use of masking and backup boards as required.

   d. Maintain control of abrasive grit, concrete dust and debris at end of each day of blasting operations.

B. Edges and both sides of joints shall be tooled to 3/16-inch radius unless otherwise indicated.

C. Repair any defective pavements as directed. Remove any extraneous projections, fill any depressions or voids and parch in accordance with applicable requirements specified in...
Section 03 30 00.

3.10 CURING

A. Cure exposed concrete in accordance with Caltrans Standard Specifications Section 90.

B. For noncolored concrete use only water or curing compounds which impart no permanent color or gloss shall be used for curing concrete pavements.

C. For colored concrete areas, cure concrete with color wax.

END OF SECTION