BID DOCUMENTS COVER SHEET

CONTRACT DOCUMENTS

FOR

C-633/PAC-SEISMIC RETROFIT
PERFORMING ARTS CENTER

at

CONTRA COSTA COLLEGE
2600 Mission Bell Drive, San Pablo, CA. 94806

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

DSA File #7-C1
DSA Application #01-115290

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March 18, 2016
SECTION 00007
SEALS PAGE AND DSA TESTS

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HM2.13 HAZ. MAT. PLANS – RESTROOMS, RAMPS, COAT RM, Prepared by RGA Environmental
HM2.40 HAZ. MAT. ROOF PLAN, Prepared by RGA Environmental

REFERENCE
REF-A-1 REFERENCE - ORIGINAL CODE INFORMATION
REF-A-2.3 REFERENCE - BARRIER REMOVAL
REF-A-3 REFERENCE – FLOOR PLAN
REF-C1.1 REFERENCE - C-635 AS-BUILTS
REF-T003 REFERENCE – T003 – CAMPUS SITE PLAN

END OF SECTION 00010
SECTION 00015
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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

NOTE: ADA pathways are marked in bright red, and the new construction area is shaded pink.
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/PAC Seismic Retrofit-Performing Arts Center.

Construction Cost Estimate (Range): $850,000 to $1,250,000; License Required: B-General Building Contractor.

Scope:
General construction to seismically retrofit the Knox Performing Arts Center located on Campus. Other Work includes, but is not limited to: temporary construction; abatement; demolition; ADA improvements; building new mezzanines and offices; seismic upgrades; and related electrical, mechanical, plumbing, fire protection, interior signage and architectural finishes.

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-arc.com/arcEOC/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: http://www.4cd.edu/webapps/PurchasingViewBids/default.aspx. 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.

IMPORTANT INFORMATION:
Pre-Bid Meeting and Job Walk: March 29, 2016, at 11:00AM - MANDATORY
Pre-Bid Meeting and Job Walk, Location: Knox Performing Arts Center, Contra Costa College
2600 Mission Bell Drive, San Pablo, CA, 94806
Last Date / Time for Bidder’s Requests for Information: April 6, 2016, prior to 5:00PM
Last Day to Issue Addendum: April 13, 2016
BIDS DUE NO LATER THAN: April 19, 2016, prior to 2:00 PM
Bids Must Be Received at: Contra Costa Community College District (Lobby)
500 Court St.
Martinez, CA 94553
Attn: Jovan Esprit – Contracts Manager (CCCCD)

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, with emphasis on Section 4104, known as the “Subletting and Subcontracting Fair Practices Act, effective July 1, 2014.

Attention is directed to Labor Code Section 1725.5 regarding Department of Industrial Relations (DIR) contractor registration process including registration criteria and implementation of DIR registration requirements. Labor Code Section 1771.7 establishes contractor’s obligation to submit Certified Pay Roll (CPR) to the Department of Labor and Standards Enforcement (DLSE) and public works monitoring and enforcement. Labor Code Section 1773.3 requires the District to submit a PWC-100 to DIR for all public works contract awarded effective January 1, 2015.

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 $2,500 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 irregularity 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. Payment shall be made to ARC Reprographic Services for the cost of printing. To view and/or 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.

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/PAC Seismic Retrofit, Performing Arts Center – 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 Knox Performing Art Center Drawings

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

C. Civil Survey


E. As-Built Drawings, prepared by McPeak Electrical, for recent work at Knox Performing Art Center (2 sheets).

F. As-Built Drawings, prepared by Protech Theatrical, for recent work at Knox Performing Art Center (12 sheets).

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
SECTION 00300
BID PROPOSAL FORM

PROJECT NUMBER / NAME: C-633/PAC - Seismic Retrofit, Performing Arts Center

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 Name</th>
<th>Business Address/Phone</th>
<th>CSLB License # and DIR Registration #</th>
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</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: ________________________________

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

Contra Costa Community College District
Contra Costa College
C-633/PAC - Seismic Retrofit, Performing Arts Center

Section 00350 - Page 1 of 1
Non Collusion Affidavit
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:  □ Corporation

(as it appears on license)  □ 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/PAC - Seismic Retrofit, Performing Arts Center

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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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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</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>
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<tr>
<th>Name</th>
<th>Position</th>
<th>Years with Partnership</th>
<th>% Ownership</th>
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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>
</tr>
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</tbody>
</table>
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>
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<th>Person’s Name</th>
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<th>Dates of Person’s Participation with Company</th>
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</tbody>
</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>
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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?
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

   ☐ Construction  ☐ Site Development  ☐ Installation  ☐ General  ☐ Package  ☐ Other

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?
☐ Yes ☐ No
If “yes,” on a separate signed page (referring to this question) state the following: (i) state the name, address and telephone number of each such claimant; (ii) the date of the claim; and (iii) the disposition thereof.

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

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**
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/PAC - Seismic Retrofit, Performing Arts Center 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  Date

or

________________________________________ __________________________
Manager – Buildings & Grounds                  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
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 CodeSections 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
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 ) s.
COUNTY OF ) ss.

On ___________________________ before me, ______________________________________,
(insert name and title of the officer)
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: ____________________________
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.
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.

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

Contractor Address: ____________________________________________________________


(§1.2) Effective Date: __________________________

(§1.3) The Work: C-633/PAC - Seismic Retrofit, Performing Arts Center

(§1.4) Completion Time: 94 Calendar Days from the Notice to Proceed to Substantial Completion, and 32 Calendar Days from Substantial Completion to Final Completion (Remaining Work).

(§1.5.1) Liquidated Damages, Substantial Completion: $2,500 per Calendar Day beyond the Contract Substantial Completion Date.

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

(§1.6) Public Agency’s Agent: CONTRA COSTA COMMUNITY COLLEGE DISTRICT ("District")

(§1.7) Contract Sum: __MILLION__ THOUSAND, __HUNDRED DOLLARS and NO CENTS ($00,000,000.00)

2. SCOPE OF WORK:

The Scope of Work consists of general construction to seismically retrofit the Knox Performing Arts Center located on Campus. Other Work includes, but is not limited to: temporary construction; demolition; ADA improvements; building new mezzanines and offices; seismic upgrades; and related electrical, mechanical, plumbing, fire protection, interior 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
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 there from; 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:

<table>
<thead>
<tr>
<th>Description</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Per occurrence (combined single limit)</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>(2) Project Specific Aggregate (for this project only)</td>
<td>$2,000,000.00</td>
</tr>
<tr>
<td>(3) Products and Completed Operations</td>
<td>$1,000,000.00</td>
</tr>
</tbody>
</table>

(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:

<table>
<thead>
<tr>
<th>Description</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Automotive and truck where operated in amounts</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>(2) Material Hoist where used in amounts</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>(3) Explosion, Collapse and Underground (XCU coverage)</td>
<td>$1,000,000.00</td>
</tr>
</tbody>
</table>

(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 be 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 unforeseeable 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.     ACKNOWLEDGEMENT (By Corporation, Partnership or Individual)
County of Contra Costa        )

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: _______________________________

(END OF SECTION 00600)
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
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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”.

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 As-Built 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 said (1)
without first consulting the Architect for further instructions regarding said Work or (2) disregarded the Architect’s instructions regarding said work.

1.2.2.3  **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 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 writing. 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 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.

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 detailed 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 resubmission 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 identification of each item clearly stating in narrative form, as well as “clou ding” 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 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 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 and DSA. 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 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 ticket 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, on 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.

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

3.18.6.6 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.

3.18.6.7 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.

3.18.6.8 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.

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

3.18.6.10 Allow for building movement, including thermal expansion and contraction.
3.18.6.11 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.

3.18.6.12 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.

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

3.18.7 District-Installed Products

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

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

3.18.7.3 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.

3.18.7.4 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 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 drawings 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. All 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>Material (attach itemized quantity and unit cost plus sales tax)</th>
<th>EXTRA</th>
<th>CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor (attach itemized hours and rates)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment (attach invoices)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
</tr>
<tr>
<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>
<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 avoidable 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 As-Built 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 As-Built 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 AS-BUILT DOCUMENTS**

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

9.9.1 As-Built Drawings
9.9.2 As-Built Specifications
9.9.3 As-Built Product Data
9.9.4 As-Built MEP & Structural coordination documents
9.9.5 Project As-Built 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 As-Built 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 As-Built

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 As-Built Documents purposes. Label each document (on first sheet or format page) "As-Built" in 2-inch high printed letters. Keep all As-Built documents current.

A reference by number to a Change Order, CCD, RFI, RFQ, 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 As-Built 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 As-Built 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 As-Built 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 As-Built Drawing data, whether the individual or entity is the installer, Subcontractor or similar entity, is required to prepare the mark-up on As-Built Drawings.

Contractor shall prepare As-Built Drawings: Immediately prior to inspection for Certification of Substantial Completion of the Work, review completed marked-up As-Built 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 AS-BUILT 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 As-Built Specification

Contractor shall, during the construction period, maintain one copy of the Project Specifications, including all addenda and all other modifications issued for Project As-Built Documents purposes.

Contractor shall mark the Project As-Built specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and/or modifications issued. Note related Project As-Built 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 As-Built Product Data

Contractor shall, during the construction period, maintain one copy of each Project As-Built Product Data submittal for "Project As-Built Document" purposes.

Contractor shall arrange Project As-Built 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 As-Built 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 As-Built 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 As-Built 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 manufactures, 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 9.1.

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 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.

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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 antinolite.

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 harmless 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, 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 Make samples available to the Independent Testing Laboratory. 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. 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 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 not required by regulatory agencies:

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 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 13.5.4.

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 Contact, 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

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 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 the Knox Performing Arts Center located on Campus. Other Work includes, but is not limited to: temporary construction; demolition; ADA improvements; building new mezzanines and offices; seismic upgrades; and related electrical, mechanical, plumbing, fire protection, interior 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 skining 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
   A. Contractor shall provide and pay for field engineering services by an engineer licensed in the
      State of California, required for the Project, including, without limitation:
      1. Survey work required in execution of the Project.
      2. Civil or other professional engineering services specified, or required to execute
         Contractor’s construction methods.

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. Temporary Work Activity Plan shall include:
   1. Full size drawing (36”x42”) of site plan showing the proposed locations and dimensions of temporary facilities and 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 and safety barriers, and dust partitions; and temporary measures to maintain continuous and uninterrupted code compliant use of all occupied and surrounding areas impacted by construction activities. 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 two (2) hard copies at the pre-construction meeting, and email Adobe PDF Format of the initial submittal of the Temporary Work 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 and other barriers as required prior to the start of abatement or demolition activities, whichever may occur first, and they must remain in place until the completion of that activity where required.
D. Contractor shall perform and complete all Temporary Work Activities to ensure the following:
   1. The continuous and uninterrupted use of all occupied areas or areas within buildings that require 24/7 utility services, including but not limited to the applicable power, data, telephone, waterline, fire alarm system, fire sprinkler system mechanical, HVAC, 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 and utility systems.

1.3 SUMMARY OF WORK RESTRICTIONS

A. General: All Temporary Work 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 Temporary Work 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 1.2 above installed, operational and accepted by the District prior to starting demolition or other Work as applicable.

B. Time Related Work Restrictions within the Contract Time

1. Although the Contract Time is a total of 94 calendar days between the Notice to Proceed and Substantial Completion, as articulated in Section 00600, Construction Agreement, Work by the Contactor is restricted and limited to specific time periods at specific locations during this contract duration as follows:

1.1. All Work at the Project Site: Work at the Project Site cannot commence any earlier than Friday, May 27, 2016, unless otherwise approved by the District.

1.2. Saturday Work: Contractor shall include in its bid the cost to work eight hours every Saturdays on critical and near critical path schedule activities at the Project Site between June 18, 2016 and August 14, 2016 (i.e., near critical path schedule activities include any schedule activity with less than 5 work days of total float).

1.3. Contractor CANNOT work on Sundays, or the following days after May 27th, 2016 since the College will be using the facility for performances: May 28th, June 2nd, June 3rd, June 4th, and June 11th.

1.4. Abatement and demolition CANNOT start in Room #106, #108, #112 and #117 until June 14th, 2016 since the College requires these spaces when using the facility for performances.

2. The Contractor is responsible for its own means and methods to comply with these work restrictions, and to submit a schedule in accordance with Section 00700, Article 3.8.

C. Other Project Requirements to Meet the Contract Time

1. The Contractor’s staging area for trailers, construction vehicles, construction equipment and materials is restricted to the PAC parking lot between the building and Castro Road, including
the side yard. Parking on Castro Road is also available for vehicles (i.e., cars and trucks) of construction personnel, but Contractor’s is responsible for procuring parking passes from the Campus Police Department.

2. Not used.

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 described in this specification section.

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 described above.

END OF SECTION 01140
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
SECTION 01312
PROJECT MEETINGS

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
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>
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<td><strong>III. AIR QUALITY</strong></td>
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<td>AIR-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 review 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:</td>
<td>Implement the emission control measures listed in Mitigation Measure AIR-1 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-1 are included</td>
<td>1. Before grading begins</td>
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<td>Recommended Mitigation Measures</td>
<td>Action and Implementation Timing</td>
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<td>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>1. Before grading begins 2. During project construction</td>
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### Recommended Mitigation Measures

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<th>AIR-2 Continued</th>
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<tr>
<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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</tbody>
</table>

### AIR-3a: Implement Mitigation Measure AIR-1

See Mitigation Measure AIR-1

### AIR-3b: Implement Mitigation Measure AIR-2

See Mitigation Measure AIR-2
<table>
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<tr>
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<tr>
<td>IV. BIOLOGICAL RESOURCES</td>
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<td>BIO-1: 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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<tr>
<td>BIO-2a: 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>BIO-2 Continued</td>
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<td>BIO-2b: The District shall obtain the appropriate federal and State permits for any construction activities and/or structures located below the OHWM of Rheem Creek and/or its tributary. Assuming that the total area impacted would be less than 0.5 acre (21,780 square feet), construction of the pedestrian bridges would likely qualify for authorization under Nationwide Permit (NWP) 14 (Linear Transportation Projects), which regulates &quot;activities required for the construction, expansion, modification, or improvement of linear transportation crossings (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the U.S...&quot;</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>Recommended Mitigation Measures</td>
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<td>BIO-3: 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 through 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>
<td>Name: Date:</td>
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V. CULTURAL RESOURCES
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<th>Recommended Mitigation Measures</th>
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| 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:  
"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 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."  
The Contra Costa Community College District shall verify that the language has been included in the contract documents. |
| CULT-1 Continued  
1. Include the directive described in Mitigation Measure CULT-1 in contract documents  
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  
1. Contra Costa Community College District  
2. Construction contractor  
1. Contra Costa Community College District  
2. Contra Costa Community College District  
1. Verify that the appropriate language has been incorporated in contract documents  
2. Visit project site and verify that measures are being implemented and that any reports are submitted to the NWIC  | 1. Before grading begins  
2. During project construction | Name:  
Date: |
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<th>Recommended Mitigation Measures</th>
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<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 “historical resources” 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 “unique archaeological resource” 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>
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<td>Recommended Mitigation Measures</td>
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<td><strong>CULT-2 Continued</strong></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><strong>CULT-3</strong>: 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 Descendant 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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**Recommended Mitigation Measures**

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<tr>
<td><strong>CULT-3 Continued</strong> 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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**VI. GEOLOGY AND SOILS**

<p>| 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. CCCCD Facilities 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. | Complete a subsurface fault investigation prior to construction | Contra Costa Community College District | Contra Costa Community College District | Verify that subsurface fault investigation is completed | Prior to construction | Name: Date: |</p>
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<th>Recommended Mitigation Measures</th>
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<tr>
<td>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. CCCCDD Facilities staff and the DSA shall review and approve the design of project improvements and utilities prior to DSA project approval.</td>
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<tr>
<td>Consider the potentially active and active fault traces and incorporate measures to ensure damage due to rupture is minimized prior to construction</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify with DSA that design measures minimize potential damage from rupture</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td>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.</td>
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<tr>
<td>Perform a geotechnical investigation to identify potential liquefiable sediments by Rheem Creek</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that geotechnical investigation is completed</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td>Recommended Mitigation Measures</td>
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<td>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.</td>
<td>Perform a geotechnical investigation to evaluate slope stability along the hillside portion of the project site</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that geotechnical investigation is completed</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<td>GEO-4: Implement Mitigation Measure HYD-1.</td>
<td>See Mitigation Measure HYD-1.</td>
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<td>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 at 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.</td>
<td>Perform a geotechnical investigation to identify the dynamic compaction potential at the project site</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that geotechnical investigation was completed</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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<tr>
<td>GEO-6a: 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.</td>
<td>Incorporate recommendations from geotechnical investigations into development plans</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that recommendations from geotechnical investigations are incorporated into all development plans</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
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### Recommended Mitigation Measures

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<th>GEO-6b</th>
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<td>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.</td>
<td>Incorporate recommendations from geotechnical investigations into development plans</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that recommendations from geotechnical investigations are incorporated into all development plans</td>
<td>Prior to construction</td>
<td>Name: Date:</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>HAZ-1a</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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete a lead-based paint survey as described in Mitigation Measure HAZ-1a</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that the survey has been conducted</td>
<td>Before demolition begins</td>
<td>Name: Date:</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>HAZ-1b</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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete an asbestos survey as described in Mitigation Measure HAZ-1b</td>
<td>Contra Costa Community College District</td>
<td>Contra Costa Community College District</td>
<td>Verify that the survey has been conducted</td>
<td>Before demolition begins</td>
<td>Name: Date:</td>
</tr>
</tbody>
</table>
### VIII. HYDROLOGY AND WATER QUALITY

<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>
</tr>
</thead>
<tbody>
<tr>
<td>HYD-1: 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 CCCCD 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 HYD-1</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>
<td>Name: Date:</td>
</tr>
</tbody>
</table>
### Recommended Mitigation Measures

<table>
<thead>
<tr>
<th>Recommended Mitigation Measures</th>
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<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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</thead>
</table>
| 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. | Contra Costa Community College District | Contra Costa Community College District | | | |
<p>| HYD-2: Implement Mitigation Measure HYD-1. | See Mitigation Measure HYD-1. | Contra Costa Community College District | Contra Costa Community College District | | | |
| 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 | |
| HYD-4: Implement Mitigation Measure HYD-1. | See Mitigation Measure HYD-1. | Contra Costa Community College District | Contra Costa Community College District | | | |</p>
<table>
<thead>
<tr>
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<th>Action by Monitor</th>
<th>Monitoring Timing</th>
<th>Verification of Compliance Name/Date</th>
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</thead>
<tbody>
<tr>
<td>XI. NOISE</td>
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<td></td>
<td>Name:</td>
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<tr>
<td>NOISE-1: The project shall implement the following noise reduction measures:</td>
<td>Implement the noise-reducing measures described in Mitigation Measure NOISE-1</td>
<td>Construction contractor</td>
<td>Contra Costa Community College District</td>
<td>Visit project site and verify that noise control measures are being implemented</td>
<td>During project construction</td>
<td>Date:</td>
</tr>
</tbody>
</table>
PART 2 – PRODUCTS - Not Used.

PART 3 – EXECUTION - Not Used.

END OF SECTION 01415
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
thoroughfares, 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 ½ 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 descendant or the descendant 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
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, soil compaction, 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. Contractor shall obtain written approval and pay all required fees of governing agencies having jurisdiction (e.g., EBMUD and Fire District) prior to using any fire hydrant water on or off Contra Costa Community College District property.
   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 staging areas and exterior building work areas for public safety, security 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/or 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 10 way finding signs on metal posts to match existing at the Project Site, or on fencing or other structures as approved by the District. 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 too 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 required and applicable as approved 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, if any, 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
SAMPLE 1

AA, BIO, HS, LA, & PS BUILDINGS, BOOKSTORE, LIBRARY, POLICE

.080 ALUMINUM
BACKGROUND: REFLECTIVE WHITE
BLACK TEXT AND GRAPHICS
ISA PAINTED FEDERAL BLUE WITH WHITE GRAPHIC AND BORDER
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-cost.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 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, 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 manuals and guides for operating the programs. Program shall be Windows compatible, latest edition or as requested by the District. Provide required licenses to District at no additional cost.

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 sequences 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
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Selective demolition of building elements.
   1. Protect items in place as indicated on the Drawings.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the College’s property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the College’s property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to the College’s designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

E. Materials Ownership: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the College’s property, demolished materials shall become the Contractor’s property and shall be removed from the site with further disposition at the Contractor’s option.

1.3 SUBMITTALS

A. Schedule of selective demolition activities indicating the following:
   1. Interruption of utility services and security devices.
   2. Coordination for shutoff, capping, and continuation of utility services and security devices.
   3. Removal and/or relocation of components and systems indicated on the Drawings and as required for new work as shown.

B. Work Description: Submit proposed methods and operations of protection of existing finishes to the Architect for review and approval prior to the commencement of work. Mockups may be required.
1. Submit a complete set of shop drawings indicating the protection methods and materials. Include attachment and support details and all required dimensions. Include proposed method of protecting construction previously not exposed to the elements from adverse weather conditions until the building is weather tight.
2. Include an inventory of items to be removed and salvaged.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

D. Record drawings at Project closeout identifying and accurately locating capped utilities and other subsurface structural, electrical, plumbing, mechanical, and security devices.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. The Contractor is hereby directed to recognize the value and significance of the building, and exercise special care during all phases of the work to ensure that the existing building, its details, materials and finishes that are to remain or to be salvaged for the intention of reinstallation are not damaged by the work being performed.
   1. The Contractor shall be responsible for the actions of his/her personnel and of the Contractor’s subcontractors.

1.5 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purposes will be maintained by the College as far as practical.

B. Coordinate the performance of work in this Section with related or adjacent work.

C. Protection of items should be completed prior to commencement of new construction and demolition procedures. At the end of working day or during inclement weather, cover work exposed to weather with waterproof coverings, securely anchored.

D. Hazardous materials are not expected to be encountered in the Work. If any materials suspected of containing asbestos or lead are encountered, do not disturb the materials. Immediately notify the Architect and the College’s Project Manager.

PART 2 - PRODUCTS

2.1 PROTECTION MATERIALS

A. Polyethylene Sheets: 4 mil.

B. Lumber: Species to be selected by the Contractor, with sizes to fit field conditions. Lumber shall be fire retardant treated.
C. Plywood: 1/2-inch or 3/4-inch fire retardant treated.

D. Soft Fiberboard
   1. 1/2-inch Homasote.
   2. 1/2-inch NCFR Homasote for exposed locations.

E. Neoprene: 1/4-inch or 1/2-inch strips stock sizes.

F. Polyurethane Foam Sheets: 4-inches thick.

G. Plastic Film Tape: As manufactured by 3M, “Scotch Brand No. 472”; Surface Armor LLC; American Biltrite Inc.

H. Kraft paper.

I. Accessories: Provide necessary and related parts, fasteners, devices and anchors required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that affected utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
   1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
   2. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

C. When unanticipated plumbing, mechanical, electrical, security, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.

D. Survey the condition of the buildings to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structures during selective demolition.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. General
   1. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
2. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized by the College’s Project Manager.
3. Provide temporary services during interruptions to existing utilities, as acceptable to the College’s Project Manager and to governing authorities.

B. Conform to the College’s specific procedures relating to utility services where utility services are required to be removed, relocated, or abandoned during selective building demolition.

3.3 PREPARATION

A. Conduct demolition operations and remove debris to ensure minimum interference with streets, walks, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the College’s Project Manager and authorities having jurisdiction.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
   1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   2. Protect existing site improvements, appurtenances, and landscaping to remain.
   3. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces to ensure that no water leakage or damage occurs to structure or interior areas.
   4. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.

C. Provide and maintain interior and exterior bracing or structural support to preserve stability and prevent movement, settlement, or collapse of portions of building to be selectively demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

C. Clean adjacent site areas of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.
3.5 INSTALLATION OF PROTECTION

A. General
   1. Alternative methods to specified protection may be acceptable if equal or
greater protection is provided. Submit alternative methods to the Architect for
review as specified. Do not proceed with alternative methods until specified
approvals are secured. Mockups may be required.
   2. Protection may be required to remain in place for the duration of the Project.
As such, materials shall be installed to provide adequate protection
throughout the full extent of construction activities. Repair or reinstall
protection as required throughout the duration of construction. Changes to
protection shall be proposed to the Architect for approval prior to making
changes.
   3. All protection assemblies should be self-supporting and self bracing, and
secured at the base, unless otherwise noted.

3.6 SELECTIVE DEMOLITION

A.Demolish and remove existing construction only to the extent required by new
construction and as indicated. Use methods required to complete Work within
limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions
required. Use cutting methods least likely to damage construction to remain
or adjoining construction. To minimize disturbance of adjacent surfaces, use
hand or small power tools designed for sawing or grinding, not hammering
and chopping. Temporarily cover openings to remain.
   2. Cut or drill from the exposed or finished side into concealed surfaces to avoid
marring existing finished surfaces.
   3. Do not use cutting torches until work area is cleared of flammable materials.
At concealed spaces, such as duct and pipe interiors, verify condition and
contents of hidden space before starting flame-cutting operations. Maintain
portable fire suppression devices during flame-cutting operations.
   4. Maintain adequate ventilation when using cutting torches.
   5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable
materials and promptly dispose of off-site.
   6. Dispose of demolished items and materials promptly.
   7. Return elements of construction and surfaces to remain to condition existing
before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at
junctures with construction to remain, using power-driven masonry saw or hand
tools; do not use power-driven impact tools.
   1. Use a pacometer to locate all existing rebar within any existing concrete to be
demolished. Before drilling or cutting any rebar, obtain bar-by-bar permission
in writing from the Architect.

3.7 CUTTING AND PATCHING

A. General: Employ skilled workmen to perform cutting and patching. Proceed with
cutting and patching at the earliest feasible time and complete without delay.
1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer’s recommendations.
   1. In general, where cutting, use hand or small power tools designed for sawing or 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. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
   4. Comply with requirements of applicable Sections where cutting and patching requires excavating and backfilling.
   5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. 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. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
   4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal
   1. Transport demolished materials off the College’s property and legally dispose of them.
2. When hauling is done over highways or city streets, loads shall be trimmed and the vehicle shelf areas cleaned after each loading.
3. Contractor shall pay all permit and disposal fees for off-hauled materials.

3.9 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.
B. All residue and debris from protection work shall be removed from existing construction leaving the premises clean and neat.

3.10 SELECTIVE DEMOLITION SCHEDULE

A. Remove the Following: Demolished site construction materials.

END OF SECTION
SECTION 02 82 00
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 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 Monitoring: 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 serpentinite (chrysotile), riebeckite (crocodolite), cummingtonite-gunterite (amosite), anthophylite, 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:

**DANGER**
CONTAINS ASBESTOS FIBERS
CANCER AND LUNG DISEASE HAZARD
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

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 and fill.
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 potion 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 transmit 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. 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.

C. The following materials shall be disposed of as regulated asbestos-containing material (RACM): All Category I and Category II materials rendered friable during the removal process.

D. The following materials can be disposed of as Category II Non-friable ACMs if they are not rendered friable during removal: mirror mastics, 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.
E. The following materials can be disposed of as Category I Non-Friable ACMs if they are not rendered friable during removal: asphaltic roof field.

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.

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. 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.

10. 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.

11. 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.

12. 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.

13. Licenses: Submit copies of state and local licenses, evidence of Cal-OSHA registration and permits necessary to carry out the work of this contract.

14. 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.
15. 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. 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 (NVLAP).
   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 0.01f/cc 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
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING 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:

DANGER CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

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. 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 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 critical barrier negative pressure containment(s) for the removal of asbestos-containing vinyl floor tile and associated mastics and assumed ACM mirror mastics (as required). The work area(s) shall be placed under negative pressure as outlined in this specification throughout the abatement work period.

B. Containment is not required for the exterior, non-friable roofing work. All exterior asbestos abatement not conducted in containment shall be carried out in a regulated area demarcated with asbestos warning signs and tape and 6-mil poly drop sheets sufficient in size to capture fallen debris.

C. 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.

D. 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.

E. 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.

F. Contractor shall construct an equipment decontamination enclosure system consisting of a washroom, holding area and clean room separated by airlocks.

G. 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 vinyl floor tile and floor tile mastics, mirror mastic, 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>
</tbody>
</table>
Not in excess of 5.0 f/cc (50 X PEL)  
Full facepiece air purifying respirator equipped with high efficiency filters

Not in excess of 10 f/cc (1,000 X PEL)  
Any powered air purifying respirator equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode

Not in excess of 100 f/cc (10,000 X PEL)  
Full facepiece supplied air respirator operated in pressure demand mode

Greater than 100 f/cc or unknown concentration  
Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus

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 also shall 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. 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 floor tile to prevent disturbance during installation of replacement finishes and required construction.

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.

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 REGULATED AREA MONITORING

A. Prior to each work shift and continuously throughout the project, each containment and decontamination enclosure system shall be inspected and repaired as needed.

B. 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.

3.6 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.

3.7 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 recleaned area. All costs incurred by the District or District’s Environmental Consultant...
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.

3.8 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 reclaned 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.

3.9 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 (NESHAP), 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.

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 Quantities To Be Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Mastic Associated with 12” Brown Vinyl Floor Tile</td>
<td>Coat Room 102</td>
<td>Cat. II</td>
<td>Tile: ND</td>
<td>30 sf</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mastic: 10% CH</td>
<td></td>
</tr>
<tr>
<td>Tar and Gravel Roof Field</td>
<td>South Side Roof at North Wall</td>
<td>Cat. I</td>
<td>15% CH</td>
<td>600 sf</td>
</tr>
<tr>
<td>Mirror Mastic</td>
<td>Restrooms - Women’s 106 &amp; Men’s 108</td>
<td>Cat. II</td>
<td>ASSUMED</td>
<td>120 sf</td>
</tr>
</tbody>
</table>

NA = Not Applicable, CH = Chrysotile, TR = Tremolite, RACM = Regulated asbestos containing material (friable), 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

END OF SECTION 02 82 00
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:

<table>
<thead>
<tr>
<th>Phase/Task</th>
<th>Anticipated Date(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization</td>
<td></td>
</tr>
<tr>
<td>Set-up of work area(s), containments</td>
<td>12/15/2022</td>
</tr>
<tr>
<td>Abatement</td>
<td>12/20/2022</td>
</tr>
<tr>
<td>Final Cleaning</td>
<td>12/30/2022</td>
</tr>
<tr>
<td>Visual Inspection</td>
<td>12/31/2022</td>
</tr>
<tr>
<td>Final Clearance (visual and air sampling)</td>
<td>1/15/2023</td>
</tr>
<tr>
<td>Teardown</td>
<td></td>
</tr>
<tr>
<td>Demobilization</td>
<td></td>
</tr>
</tbody>
</table>

IV. Equipment and Materials
List all equipment and materials to be used, such as the following:

<table>
<thead>
<tr>
<th>Equipment/Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEPA Vacuums</td>
</tr>
<tr>
<td>Negative air filtration units</td>
</tr>
<tr>
<td>Scrapers</td>
</tr>
<tr>
<td>Manometers</td>
</tr>
<tr>
<td>Power saws</td>
</tr>
<tr>
<td>Shower facilities</td>
</tr>
<tr>
<td>Pry bars</td>
</tr>
<tr>
<td>Airless sprayers/compressors</td>
</tr>
<tr>
<td>Cutting shears</td>
</tr>
<tr>
<td>Cleaning detergents</td>
</tr>
<tr>
<td>Other hand tools</td>
</tr>
<tr>
<td>Solvents (must be approved by District)</td>
</tr>
<tr>
<td>Encapsulants/sealants</td>
</tr>
<tr>
<td>Roller/brushes</td>
</tr>
<tr>
<td>Gloves</td>
</tr>
<tr>
<td>Disposable coveralls</td>
</tr>
<tr>
<td>Respiratory protection</td>
</tr>
<tr>
<td>Eye &amp; foot protection</td>
</tr>
<tr>
<td>Fall Protection</td>
</tr>
<tr>
<td>Scaffolds/Ladders</td>
</tr>
<tr>
<td>Gas/Diesel Powered Equipment</td>
</tr>
</tbody>
</table>

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:*

- OSHA Class I, II, III and IV work
- Wet methods
- Negative pressure enclosure
- Glovebag removal
- Respiratory protection
- HEPA vacuums
- Mini-containments
- Solvent removal of mastic
- List other procedures

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 02 83 00

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 Public Health (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 heath 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 #2 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 such as ceramic tile. The Contractor shall determine and implement applicable OSHA worker protection requirements (8 CCR 1532.1) 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 including but not limited to ceramic tile.

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: (1) 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 Public Health (DPH) 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 cleaning 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 \( \mu g/m^3 \) lead per 8-hour work shift or 1 \( \mu g/m^3 \) 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 sheeting and for attachment of polyethylene sheeting 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.
   B. All hazardous waste shipping containers shall meet applicable DOT requirements.

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 magnahelic 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, booties or 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 rotopeen 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.

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 (µg/m³) of lead averaged over an eight-hour work period or 5.0 µg/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:

1. Copies of workers' post-abatement medical test results and performed in accordance with Title 8 CCR 1532.1 Lead.

2. Copies of hazardous waste manifest, profile sheets and weight tickets for all hazardous waste and for all non-hazardous waste or waste recycle receipts.

3. 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 02 83 00
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 DPH (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:

<table>
<thead>
<tr>
<th>Phase/Task</th>
<th>Anticipated Date(s)</th>
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<tr>
<td>Mobilization</td>
<td></td>
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<tr>
<td>Set-up of work area(s), containments</td>
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</tr>
<tr>
<td>Lead-related construction</td>
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<tr>
<td>Final Cleaning</td>
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<tr>
<td>Visual Inspection</td>
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<td>Final Clearance (visual and sampling)</td>
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<td>Teardown</td>
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<td>Demobilization</td>
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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
- Wet methods
- Negative pressure enclosure
- Local exhaust ventilation for tools
- Respiratory protection
- HEPA vacuums
- Vacuum assisted blasting
- General room ventilation
- Containment (i.e., poly barriers)
- Interface of trades involved
- Methods to assure safety of bldg occupants
- Pollution control
- Removal method to reduce lead dust generation

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 02 87 00
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.

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: Dioctylphthalate, 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 that will not be reinstalled in fixtures 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 UWs. 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 cleaned 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. Hoise 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 withing 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 items 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 02 87 00
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:
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 | 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)
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

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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 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 19A

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, 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 Divisions 0 and 1 requirements, the more stringent requirements for the Contractor apply. Do not submit items not requested.

1. Submittal Schedule: See Section 03 30 00.
2. 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.
3. Samples - At request of Architect, submit samples of form ties and spreaders.
4. 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.
5. 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.
6. 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: Divisions 0 and 1 & Section 03 30 00

C. SER Submittal Review: See Section 03 30 00

D. Substitution Request: See Divisions 0 and 1 & Section 03 30 00

E. Request for Information (RFI): See Section 03 30 00

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. 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.

F. 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 ¾-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.

G. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:
   1. Type: Of size, strength and quality to meet the required quality of formwork.

H. 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 00700.

I. 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.

J. 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.

K. 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 proper 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. 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.

D. 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.

E. Slab Forms:
1. Establish levels and set screeds.
2. Depress slabs where required to receive special floor finishes.

F. 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.

G. 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.

H. 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.

I. 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.

J. 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.

K. 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.

L. 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.

M. 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.

N. Expansion Joints:

1. Use fiber type expansion joint fillers typically and depress 1/4-inch unless otherwise noted.
2. Use cork type expansion joint fillers at conditions with non-bituminous waterproofing, liquid waterproofing or sealant systems

O. Construction Joints:

1. Provide where shown on the drawings as directed by the Architect.
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.

P. 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. 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.

D. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

E. Whenever formwork is removed during the curing period, the exposed concrete shall be cured per requirements of Section 03 30 00.

F. All wood formwork, including that used in void spaces, pockets and other similar places shall be removed.

G. Form tie holes shall be filled as per approved samples submitted to the Architect and Engineer.

H. 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. 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

Submittals Division 0 and 1
Quality Control Division 1
Concrete Formwork Section 03 10 00
Cast-in-Place Concrete Section 03 30 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 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.


7. 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 1913A.2.

2. Collect mill test reports for reinforcement.

3. Take samples from bundles at fabricators: waived in accordance with CBC Section 1913A.2.

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, and have the facilities capable of meeting all requirements of Contract Documents.
1. 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, 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.

i. 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 ICC 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.

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 Divisions 0 and 1 and Section 03 30 00

C. SER Submittal Review: See Section 03 30 00

D. Substitution Request: See Divisions 0 and 1 and Section 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. Immediately remove from site materials not complying with Contract Documents or determined to be damaged.

5. 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.

B. Welded Wire Reinforcement:
3. Size: As indicated on structural drawings.

2.2 ACCESSORIES

A. Tie Wire and Spirals:
1. Type: ASTM A82 (minimum 16 gauge annealed steel wire).
2. Wire Bar Type: Comply with CRSI.

B. 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 ½” (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.

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: ½” (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.
   3. Tolerances: Comply with ACI 117.
   4. 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 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. Tag reinforcement steel for easy identification.

8. Contractor shall coordinate the placement of the reinforcing indicated on the drawings to avoid interference while maintaining minimum cover requirements.

9. 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.

10. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.

11. 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 ACI 318 Section 7.5.
   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 \((\varnothing 36)\) 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 \((\varnothing 43)\) and #18 \((\varnothing 57)\) 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.

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 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

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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 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 Divisions 0 and 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. The Contractor’s Testing Agency’s certificate of compliance per ASTM E329.

2. 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.

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

3. 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.

4. 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.

   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

5. Submit Concrete Weighmaster affidavit if continuous inspection of batch plant has been waived per Section 1.8.E.

6. 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.

7. Structural Repairs: Submit procedures and product information.

8. Patching Defective Concrete Finishes: Submit procedures and product information.
9. 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. 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.

C. 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. Acceptance 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. Contractor is responsible for means and methods and any impacts on other portions of the work that may arise from this 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 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 1705A.3.3 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”.

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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, 1913A 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.1.2.

   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

   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 and ACI 318.

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) When high early strength concrete is required by contractor, additional cylinders shall be made and tested as required at Contractor’s expense.

viii) 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.

   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.

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.

1.9 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’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.

   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.

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.

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 "CONCRETE PASTE (LPL)", Class C Only
3. Example acceptable product: BASF “CONCRETE 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 "CONCRETE 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”.

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 silicone 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 siliconate. 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. Structural Polystyrene used as typical fill

1. Material: Rigid cellular polystyrene thermal insulation with closed cells formed by expansion of polystyrene base resin in an extrusion process.

2. Comply with the requirements of ASTM C 578, Type VI.


4. Compressive modulus, min 1400 psi (9.6 MPa), ASTM D 1621.

5. Flexural strength, 60 psi (410 kPa), ASTM C 203.

6. Thickness as indicated on drawings.

7. Example acceptable product: STYROFOAM Highload 40, The Dow Chemical Company

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:
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./ft\(^2\)/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:

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:
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 ¼ 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 C94.

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.
Place slabs on grade by the long strip cast method. Refer to ACI 302.1R for recommended methods of placement.

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.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.

Bring slab surfaces to correct level with a straightedge and strike off.

Use highway straight edges, bullfloats or darbies to smooth surface free of humps or hollows.

Do not disturb slab surfaces prior to beginning finishing operations.

Maintain reinforcing in proper position on chairs during concrete placement.

Do not place materials on slabs or impose loads during period of setting.

Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.

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.

Before new concrete is placed in contact, surfaces of hardened concrete already placed shall be thoroughly cleaned of foreign materials and laitance.

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.

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.

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 $F_r$ and $F_L$ values specified below:

   a. If an individual test section measures less than either of the specified minimum local $F_r/ F_L$ 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 $F_r/ F_L$ 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 $F_T=20$ and $F_L=15$ and minimum local value of $F_T=14$ 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 $F_T=20$ and $F_L=15$ and minimum local value of $F_T=14$ 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 $F_T=25$ and $F_L=20$ and minimum local value of $F_T=17$ 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 F₁ = 14,** use ¼” over 4 ft, no offset greater than 1/16”
- **Specified local F₁ = 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:
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 ACI 318 Section 5.11.

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. 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.

I. 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
SECTION 05 12 00
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.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

| Submittals | Division 0 and 1 |
| Quality Control | Division 1 |
| Concrete Reinforcement and Embedded Assemblies | Section 032000 |
| Cast-In-Place Concrete | Section 033000 |
| 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. 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) Shop Drawings and Erection Drawings
(2) Product Data
(3) Samples
(4) Welding Procedures Specification (WPS)
(5) Welder Certifications
(6) Mill Reports
1. **Shop drawings**
   
   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.

2. **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.

3. **Samples:** Material samples shall be provided as requested by the Owner’s Testing Agency.
4. 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.

5. 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.

6. 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.

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 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 AISC 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 (RCSC) "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. Grout: Refer to General Notes.

J. 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.
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 joining 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
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. 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

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 grind 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:
   1. End weld headed studs 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 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Steel catwalk and platform, including grating and guardrails.
   2. Painted steel guardrails at Theater.
   3. Painted steel handrails at interior ramps and stairs.
   4. Stainless steel railing at drinking fountain.
   5. Interior steel ladder as indicated on the Drawings.
   6. Safety gate at mezzanine.
   7. Link chain.
   8. Countertop supports.
   9. Non-structural miscellaneous metal channels, angle imbeds, backing and mounting plates, and other shapes as required.
   10. Rough hardware.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 07 62 00 - Sheet Metal Flashing and Trim: Provision of sheet metal flashing and trim.
   2. Section 09 90 00 - Painting and Coating: For finish painting of items not specified to have factory finish.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act
B. AGA - American Galvanizers Association
   1. Inspection Manual for Hot Dip Galvanized Products.
C. AISC - American Institute of Steel Construction Inc.
D. ANSI - American National Standards Institute
   1. A14.3 - Safety Requirements for Fixed Ladders.
   2. B18.2.1 - Square and Hex Bolts and Screws - Inch Series.
   5. B18.6.4 - Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch).
E. ASTM - American Society for Testing and Materials
10. A384 - Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
12. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
16. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
F. AWS - American Welding Society
   1. D1.1 - Structural Welding Code - Steel.
   2. D1.3 - Structural Welding Code - Sheet Steel.
   3. D1.6 - Structural Welding Code - Stainless Steel.


H. NAAMM - National Association of Architectural Metal Manufacturers
   1. MFM - Metal Finishes Manual for Architectural and Metal Products.

I. SSPC - The Society for Protective Coatings
   1. PA 1 - Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel.
   2. SP 2 - Surface Preparation Specification No. 2: Hand Tool Cleaning.
   3. SP 3 - Surface Preparation Specification No. 3: Power Tool Cleaning.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. Structural Performance of Guardrails, Handrails, and Railings: Provide guardrails, handrails, and raling systems that shall withstand structural loads without exceeding the allowable working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each of the respective components of each metal fabrication in accordance with CBC.
   2. Wind Load Requirements for Exterior Items: Members shall withstand dead and live loads caused by pressure and suction of wind in accordance with CBC.
   3. Work shall support normally imposed loads in conformity with AISC requirements.
   4. Provide for expansion and contraction.
   5. Exterior items shall exclude water.
   6. Ladders: Design ladders in accordance with requirements of NAAMM, except that for vertical ladders, the distance from ladder rung to walls shall not be less than 7 inches.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for stair nosings, paint products, and grout.

B. Shop Drawings: Submit shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
   1. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
   2. Where welded connections and concrete inserts are required, show size and locations required.

C. Quality Control Submittals: Welder certificates signed by Contractor certifying that welders comply with requirements specified under the “Quality Assurance” Article.

D. Samples: Only as requested by the Architect.
1.5 QUALITY ASSURANCE

A. Welding Standards: Comply with applicable provisions of AWS D1.1 and AWS D1.3.
   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

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.

1.6 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.

1.7 JOB CONDITIONS

A. Scheduling and 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 MATERIALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel and Iron
   1. Steel Plates, Shapes, and Bars: ASTM A36.
   2. Rolled Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
   3. Cold-Formed Steel Tubing: ASTM A500.
      a. For exterior installations and, where indicated, provide metalized-tubing.
   5. Steel Pipe: ASTM A53, Type S, Grade B, Schedule 40, unless otherwise indicated, or another weight required by structural loads.
      a. Black finish, unless otherwise indicated.
      b. Prime with red oxide primer at locations detailed to receive paint.
   6. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666, Type 316L.
   7. Stainless Steel Tubing: ASTM A554, Grade MT 316L.
10. Concrete Inserts: Anchors of type indicated below, fabricated from corrosion resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E488, conducted by a qualified independent testing agency.
   a. Threaded or wedge type; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized in accordance with ASTM A153.
   b. Provide weld plate imbedded in concrete as detailed in the Drawings. Coordinate location with other imbedded materials.

C. Fasteners: Provide plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls, concrete slabs, or ceilings. Select fasteners for the type, grade, and class required.
   1. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A, with hex nuts, ASTM A563, and, where indicated, flat washers.
   8. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in concrete and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
      b. Material: Group 1 alloy 304 or 316 stainless steel bolts and nuts complying with ASTM F593 and ASTM F594.

D. Welding Materials: AWS D1.1 and AWS D1.3, type required for materials being welded.
   1. Electrodes: E = 70XX.

2.2 STANDARD CATALOG PRODUCTS

A. Non-Shrink Grout
   1. Premixed; containing no metallic particles, requiring only addition of water.
   2. Shall have minimum working time of 15 minutes and initial set time of 30 to 45 minutes in accordance with ASTM C191.
B. Expansion Cement
1. Non-metallic, non-corrosive, pourable hydraulic type cement that is quick-setting, high strength, and non-shrinking, with the following properties
   a. Compressive Strength: 58,400 psi at 7 days in accordance with ASTM C109.
   b. Volume Change: Plus 0.31 at 7 days in accordance with ASTM C157.

C. Coatings
1. Coatings for Protection of Dissimilar Materials
   a. Dissimilar Metals: Bituminous type materials in accordance with ASTM D1187.
   b. Aluminum in Contact with Concrete, Metal, Wood, or other Absorptive Material.
2. Shop Primer for Ferrous Metal: VOC compliant, fast-curing, lead and chromate free, universal modified alkyd primer with good resistance to corrosion, compatible with finish paint systems.
4. Galvanizing Repair Paint: High zinc dust content paint, with dry film containing not less than 94 percent zinc dust by weight, as manufactured by Parker Amchem, “Galvaprep SG”; Sherwin Williams, “Zinc Clad I”; Rust-Oleum.
5. Exterior metal components/fabrications that are intended to be exposed at the completion of construction and their attachments shall be shop treated with galvanic “metalized” process; then shop primed, and painted as indicated herewith.

D. Safety Gate at Mezzanine: Steel, adjustable, self-closing, installs to existing platform and stair openings; width as indicated; safety yellow powder coat finish.
1. Product: As manufactured by FS Industries; Benko Products, Inc.; Dakota Safety.

E. Link Chain Where Indicated: Provide heavy weight link chain compatible with 7/16-inch diameter padlock hasp.

2.3 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on Construction Drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. 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.
C. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

D. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the fabrication and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
   1. Temperature Change (Range): 100 degrees Fahrenheit.

E. Shear and punch metals cleanly and accurately. Remove burrs.

F. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

G. Remove sharp or rough areas on exposed traffic surfaces.

H. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Use electric shielded-arc process in accordance with AWS.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
   5. Miter corners and angles of frames unless otherwise indicated.
   6. Make welds normally exposed to view in finished work uniform and grind smooth.

I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

J. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

K. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

L. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

M. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
N. 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.

O. Steel Catwalk: As indicated on the Structural Drawings.

2.4 GUARDRAILS, HANDRAILS, AND RAILINGS

A. Steel
   1. General: Fabricate steel guardrails, handrails, and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube or pipe, post spacings, and anchorage, but not less than that required to support structural loads.
      a. Tube Diameter: As indicated.
   2. Interconnect handrail and railing members by butt-welding or welding with internal connectors, at fabricator’s option, unless otherwise indicated.
      a. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to which end is joined, and weld all around.
   3. Form changes in direction of handrails and railings as detailed.
   4. Form simple and compound curves by bending tube or pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of tube or pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
   5. Provide wall returns at ends of wall-mounted handrails as indicated.
   6. Close exposed ends of tube or pipe by welding 3/16-inch thick steel plate in place or with prefabricated fittings.
   7. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, post base flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of handrails and railing systems to other work. Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete.
   8. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.
   9. For galvanized handrails and railing systems, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

B. Galvanized Steel Guardrails at Catwalk and Platform: As indicated on the Drawings.

C. Painted Steel Guardrails at Theater: As indicated on the Drawings.
D. Painted Steel Handrails at Interior Ramps and Stairs: As indicated on the Drawings.

E. Stainless Steel Railing at Drinking Fountain: As indicated on the Drawings.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Equip units with integrally welded anchors for casting into concrete. Furnish inserts if units must be installed after concrete is placed.
      a. Except as otherwise indicated, space anchors 24 inches on center and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4-inch thick by 8 inches long.

C. Galvanize miscellaneous interior and exterior framing and supports.

2.6 STEEL LADDER

A. General: Fabricate ladder for location shown, with dimensions, spacings, details, and anchorages as indicated.
   1. Comply with ANSI A14.3, unless otherwise indicated.
   2. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided.
   3. Siderails: Continuous, 1/2-inch by 2-1/2 inch steel flat bars, with eased edges, spaced 18 inches apart.

B. Bar Rungs: 3/4-inch diameter steel bars, spaced 12 inches on center.
   1. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.

C. Support ladder at top and bottom and not more than 60 inches on center with welded or bolted steel brackets. Brace ladder at floor. Size brackets to support design loads specified in ANSI A14.3.

D. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

E. Painting: As specified in Section 09 90 00.
2.7 FINISHES, GENERAL

A. Comply with NAAMM’s MFM for recommendations relative to applying finishes. Finish metal fabrications after assembly.

2.8 STEEL AND IRON FINISHES

A. Exterior metal components/fabrications that are intended to be exposed at the completion of construction and their attachments shall be shop treated with galvanic “metalized” process; then shop primed and painted as indicated herewith.

B. Galvanizing
   1. Galvanize items after fabrication in largest sections practicable unless otherwise permitted or recommended by ASTM A384 and ASTM 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. Other Fabricated Items: ASTM A123.

C. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
   1. Typical: SSPC SP 2, SSPC SP 3, as required.

D. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, unless otherwise indicated. Comply with requirements of SSPC PA 1 for shop painting.

E. Stainless Steel
   1. Remove or blend tool and die marks and stretch lines into finish.
   2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
   3. Satin, Directional Polish: No. 6 finish.
   4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

F. Finish Painting: As specified in Section 09 90 00.

2.9 SOURCE QUALITY CONTROL

A. Test and Inspections: The College will employ testing laboratory to test welds per CBC, Section 1705A.2.2.5.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete inserts, through-bolts, lag bolts, wood screws, and other connectors as required. Fasteners not installed but required after pour shall be submitted to the Architect for approval. Fastener shall not be installed until the Architect approval is received.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, wood, or dissimilar metals with a heavy coat of bituminous paint.

G. Steel Catwalk and Platform: As indicated on the Structural Drawings.

H. Safety Gate at Mezzanine: Install in accordance with manufacturer's written instructions.

3.2 INSTALLING GUARDRAILS, HANDRAILS, AND RAILINGS

A. Adjust guardrails, handrails, and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated. Plumb posts in each direction. Secure posts and railing ends to building construction as follows
   1. Anchor handrail and post ends to cast-in-place concrete with steel flanges welded to rail ends and anchored into wall construction with drilled-in epoxy and bolt anchors.
B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:
   1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   2. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.
   3. Where indicated, existing handrail brackets may remain in place for support of new railings.

C. Galvanized Steel Guardrails at Catwalk and Platform: As indicated on the Drawings.

D. Painted Steel Guardrails at Theater: As indicated on the Drawings.

E. Painted Steel Handrails at Interior Ramps and Stairs: As indicated on the Drawings.

F. Stainless Steel Railing at Drinking Fountain: As indicated on the Drawings.

3.3 SETTING

A. Set item shown or required to be installed in sleeves with quick-setting anchor cement unless otherwise noted.

B. Use non-shrink grout mixed in accordance with manufacturer’s directions for setting plates, bolts, and similar items.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and prime and paint exposed areas with same material as used for shop painting to comply with SSPC PA 1 requirements for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a 2.0-mil minimum dry film thickness.

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION
SECTIONS 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. Rail cap (at Mezzanines): Douglas Fir Kiln Dried S4S C & BTR

4. 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.

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.

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 2305.1.2.3.

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.

1. Preservatives shall be compatible with roofing where applicable.

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

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 lumber 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 elements of the seismic lateral force resisting system per CBC Section 1705A.11.2.
   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 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Repair and replace existing wood slat ceiling assembly.
2. Miscellaneous standing and running wood trim to match existing.
3. Remove and reinstall existing miscellaneous wood as indicated.
4. Install abrasive grit grips at wood stair treads.
5. Install compression struts at existing ceilings as specified in Section 09 51 00.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
1. Section 09 51 00 - Acoustical Ceilings: For installation of compression struts at existing ceilings.
2. Section 09 90 00 - Painting and Coating: For field finish painting.

1.2 REFERENCES

A. ANSI - American National Standards Institute
1. A208.2 - Medium Density Fiberboard for Interior Use.

B. APA - The Engineered Wood Association

C. ASTM - American Society for Testing and Materials

D. CALGreen - California Green Building Standards, 2013 Edition

E. CFR - Code of Federal Regulations

F. EPA - Environmental Protection Agency

G. FSC - Forest Stewardship Council
1. STD-01-001 - FSC Principles and Criteria for Forest Stewardship.
H. WI - Woodwork Institute

I. WWPA - Western Wood Products Association
   1. Western Lumber Grading Rules.

1.3 SYSTEM DESCRIPTION

A. Composite wood used on the Project shall comply with CALGreen Code Nonresidential Mandatory Measures, Chapter 5, Division 5.5, Section 5.504, Articles 5.504.4.5 and 5.504.4.5.3.

1.4 SUBMITTALS

A. Product Data: Submit for all items.

B. Shop Drawings
   1. Indicate dimensioned plans, sections, elevations, large scale details, location of each item, materials and wood species, component profiles, fastenings, jointing details, finishes, accessories, hardware location and schedule of finishes.
   2. Follow WI standards for shop drawings.

C. Samples: Submit samples of wood items finished as specified.
   1. At least 1 sample of finished solid stock showing complete range of variations in grain, color, and other features, minimum 6 inches by 18 inches.
   2. For wood ceiling slats, provide 6-inch long sample with applied finish to match existing.
   3. Samples shall be resubmitted for acceptable stain and finish until approved by the Architect.

1.5 QUALITY ASSURANCE

A. Forest Certification: Provide wood products made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site: Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

B. Storage and Protection: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack plywood. Provide for air circulation within and around stacks and under temporary coverings.
PART 2 - PRODUCTS

2.1 MATERIALS

A. General
   1. Lumber shall bear the grade and trademark of the association under whose rules it is produced and a mark of mill identification.
   2. Lumber shall be of sound stock, thoroughly seasoned, kiln-dried to a moisture content not exceeding 19 percent, and surfaced 4 sides, except as specifically designated for items hereinafter.
   3. Lumber complies with WWPA’s “Western Lumber Grading Rules.”

B. Interior Lumber Intended for Opaque Finish
   1. Wood Slat Ceiling Assembly: Species and texture to match existing.

C. Plywood: APA, 3/4-inch thick, with plain sliced veneer to match existing.

D. Medium Density Fiberboard (MDF): ANSI A208.2, 3/4-inch thick, Grade 130, made with binder containing no urea formaldehyde.

E. Compression Struts: As specified in Section 09 51 00.

F. Abrasive Grit Stair Grips: Black, adhesive back, size as indicated, as manufactured by Uline; Flexco Corporation; Wooster Products Inc.

G. Fasteners
   1. Provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A153, length of fastener embed into wood substrate to equal 1-1/2 times thickness of items fastened.
   2. Countersink nails and fill surface where nailing is unavoidable. Sand smooth and flush for clear finish.

H. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
   1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

I. Multipurpose Construction Adhesive: Formulation complying with ASTM D3498 that is recommended for indicated use by adhesive manufacturer.
   1. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

J. Putty: Linseed oil type, tinted to match surface finish color.

K. Back Priming: As specified in Section 09 90 00.
2.2 **FABRICATION**

A. Preparation
   1. Verify measurements at job site.
   2. Verify details and dimensions of fixtures integral with finish carpentry for proper fit and accurate alignment.

B. General Fabrication Requirements
   1. Factory-fabricate and assemble work in complete units insofar as dimensions permit shipment and installation.
   2. Kerf backs of solid members more than 5 inches wide or more than 1 inch nominal thickness.
   3. Conceal nailing where possible and set nail heads for putty in exposed portions. Pre-drill to prevent splitting.
   4. Perform corrective measures necessitated by non-conformance with WI standards. The Architect’s opinion shall govern discrepancies.
   5. Pre-prime wood and field prime end cuts.

C. Wood Slat Ceiling Assembly: Match existing profile.

D. Standing and Running Trim: As indicated on the Drawings and to match existing adjacent.

2.3 **FINISHES**

A. Shop Finishing: Provide items specified in this Section to be fabricated in accordance with WI standards, shop finished in accordance with the following requirements:

B. Preparation For Site Finishing
   2. Finish MDF smooth with no visible wart or paint wicking at fasteners.
   3. Finish opaque painting in accordance with requirements of Section 09 90 00.

**PART 3 - EXECUTION**

3.1 **INSTALLATION**

A. General
   1. Set work square, level, plumb with edges scribed, accurate, and secure in place with fastenings, clips, braces, brackets, anchors, shims, and blocks.
   2. 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 standing and running trim. 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.
   3. Conceal nailing and screwing where possible and set nail heads for putty in exposed portion and conceal screws as indicated.
4. Align fasteners for board and batten finish horizontally and vertically to match existing fasteners.
5. Miter inside and outside corners of running trim; bevel end joints together.

B. Wood Surfaces
1. Thoroughly hand sand. Take care that cross sanding is removed by final sanding in direction of grain; ease “knife-edge” corners by sanding.
2. Ensure free from dust, glue, stains, and other foreign matter and in proper condition to receive finish.

C. Wood Slat Ceiling Assembly: Install to match existing.

D. Standing and Running Trim: Install as indicated.

E. Existing Miscellaneous Wood: Remove and reinstall as indicated.

F. Abrasive Grit Stair Grips: Install in accordance with manufacturer’s written instructions.

G. Compression Struts at Existing Ceilings: Install as specified in Section 09 51 00.

3.2 ADJUSTING

A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

END OF SECTION
SECTION 07 21 01
BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Thermal and acoustical insulation.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 07 84 00 - Firestopping: Provision of firestopping.
   2. Section 09 29 00 - Gypsum Board: Provision of gypsum board.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials


1.3 DEFINITIONS

A. Thermal Resistivity: Where the thermal resistivity of insulation products are designated by “r-values”, they represent the reciprocal of thermal conductivity (k-values). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees Fahrenheit between the 2 exposed faces required to cause 1 BTU to flow through 1 square foot per hour at mean temperatures indicated.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for insulation products specified.

B. Certifications: Submit certification that insulation was furnished and installed in accordance with CBC requirements.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection: Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer’s recommendations for handling, storage, and protection during installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Thermal Insulation at Walls
   1. Unfaced, friction-fit, flexible batt or blanket of fiberglass, width to fit stud space, formaldehyde-free, 25 percent recycled content, conforming to ASTM C665, Type I, non-combustible when tested in accordance with ASTM E136, having thermal resistance rating of R-19, unless otherwise indicated, and the following fire resistive requirements when tested in accordance with ASTM E84:
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 50 or less.
   2. Provide batts to full depth of wall studs.
   3. Product: As manufactured by Johns Manville; Certainteed Corporation; Owens Corning.

B. Acoustical Insulation
   1. Unfaced, 3-1/2 inches thick, friction-fit, formaldehyde-free, flexible batt or blanket of fiberglass, width to fit wall stud or ceiling joist space, and conforming to ASTM C665, Type I, non-combustible when tested in accordance with ASTM E136 and having the following fire resistive requirements when tested in accordance with ASTM E84.
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 50 or less.
   2. Product: As manufactured by Johns Manville; Certainteed Corporation; Owens Corning.

C. Accessories
   1. Insulation Tape: Pressure-sensitive tape of type recommended by insulation manufacturer for sealing joints and penetrations in insulation.
   2. Insulation Support: Galvanized springwire as required and as recommended by insulation manufacturer.
   3. Primers and Sealers: As recommended by the insulation manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer’s instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer’s technical representative for specific recommendations before proceeding with installation of insulation.

B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.

C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

D. Tape joints and ruptures in insulation, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrate by method indicated, complying with manufacturer’s recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units.

B. Maintain required separations from electric fixtures and appliances.

C. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

D. Repairs to Existing Thermal Insulation: Where existing thermal insulation is adversely affected by work of this Project, maintain thermal barrier R-value by repairing with insulation materials of equal or greater thermal resistance rating.

3.4 ACOUSTICAL INSULATION

A. Install at all sound-rated construction including walls and floor/ceiling assemblies where indicated.

3.5 PROTECTION

A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Repair of existing built-up asphalt roof, including tie-ins.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
   1. Section 07 62 00 - Sheet Metal Flashing and Trim: Provision of sheet metal flashing and accessories.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials


C. NRCA - National Roofing Contractors Association

D. UL - Underwriters Laboratories Inc.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Roofing system shall arrest water migration from entering building through roof membrane, and will withstand wind loads, thermally induced movement and exposure to weather without failure.
1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data, including technical product information, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with requirements.
   1. For asphalt bitumen, provide a label on each container or certification with each load of bulk bitumen, indicating flash point (FP), softening point (SP), and equiviscous temperature (EVT).

B. Shop Drawings: Include plans, sections, details and attachments to other work, for the following
   1. Base flashings, cants, and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Crickets, saddles, and tapered edge strips, including slopes.

C. Quality Control Submittals
   1. Field Test Reports: Submit daily softening-point test reports on samples of asphalt used on the Project, taken at beginning of each day’s work and at 2 hour intervals during course of the work thereafter. Use Ring and Ball Test, ASTM D36, or similar recognized test method. Submit samples to independent laboratory for testing or perform tests in field at Contractor’s option.
   2. Certificates: Submit manufacturer’s certification indicating that all bulk bituminous materials delivered to the Project comply with required standards. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.
      a. Include continuous log showing time and temperature for each load of bulk bitumen, indicating date obtained from manufacturer, where held, and how transported prior to final heating and application on roof.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer (roofer) to perform built-up asphalt roofing work who has specialized in installing built-up asphalt roofing systems similar to that required for this Project and who is acceptable to manufacturer of primary roofing materials.
   1. Installer Certification: Obtain written certification from manufacturer of built-up roofing system certifying that installer is approved by manufacturer to install specified roofing system. Provide copy of certification for the Architect prior to awarding roofing work.
   2. Installer’s Field Supervision: Require installer to maintain a full-time supervisor or foreman who is on job site during times that built-up asphalt roofing work is in progress and who is experienced in installing and repair of roofing systems similar to type and scope required for this Project.

B. Regulatory Requirements
   1. Conform to CBC for roof assembly fire hazard requirements.
   2. Fire Hazard Classification: UL Class A.
   3. Except as approved by the Architect, all asphalt roofing and built-up flashing materials shall be manufactured by or be acceptable to the roofing system manufacturer.
C. Preinstallation Conference: Conduct conference at Project site in accordance with the following:

1. As soon as possible after award of built-up roofing work, meet with Installer (Roofer), installers of substrate construction, such as decks, and other work adjoining roof system including penetrating work and rooftop units, the Owner, Architect, and representatives of other entities directly concerned with roofing system performance, including the Owner’s insurers and test agencies.
   a. Review requirements (Contract Documents), submittals, status of coordinating work, availability of materials, and installation facilities and establish preliminary installation schedule. Review requirements for inspections, tests, certifications, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures.
   b. Discuss roofing system protection requirements for construction period extending beyond roofing installation. Discuss possible need for temporary roofing.
   c. Record discussion, including agreement or disagreement on matters of significance; furnish copy of recorded discussions to each participant. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

1.6 PROJECT CONDITIONS

A. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed according to manufacturers’ recommendations.

B. Substrate shall be dry and roofing shall be installed in accordance with roofing manufacturer’s requirements. All voids shall be patched; soft spots braced or removed and replaced to roofing manufacturer’s approval.

C. Hazardous materials are not expected to be encountered in the Work. If any materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and the College’s Project Manager.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Johns Manville; GAF; Owens Corning.

2.2 MATERIALS

A. Membrane Roof Composition: Provide mineral capped surface roof system with asphalt bitumen, and minimum 3 plies glass-fiber felts for lay-up as follows.
   1. Base Ply: Single ply of asphalt, glass-fiber felt, complying with ASTM D2178, Type IV.
   2. Ply Felts: Complying with ASTM D2178, Type VI; match existing number of plies.
3. Aggregate Surfacing: ASTM D1863, No. 6 or No. 67, clean, dry, opaque, water-worn gravel or crushed stone, free of sharp edges; match existing.

4. Interply Bitumen: Roofing asphalt, complying with ASTM D312, Type II and III.

B. Asphalt Primer: ASTM D41.

C. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required by roofing manufacturer for application.

D. Tapered Insulation: Rigid roof insulation board composed of closed cell polyisocyanurate foam core bonded to fiberglass reinforced facers; meets ASTM C1289 Type II, Class I, Grade 2.
   1. R-Value: 6.0 per inch; minimum total requirement R-21.

E. Flashing: Fiberglass/polyester reinforced cap flashing membrane with ceramic-coated roofing granules; complies with ASTM D6221, Type I.

F. Wood Blocking, Curbs, Cants, and Nailers: Pressure-treated lumber, sizes as required to match existing and as indicated.

G. Cover Board: ASTM C728, perlite board, 3/4-inch thick, unless otherwise indicated or required to match existing field conditions, seal coated.

H. Walkway Pads: Replace in kind if affected by work of this project.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Convene pre-installation meeting as specified in Article 1.05 of this Section.

B. Protect other work from spillage of built-up roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace/restore other work damaged when installing built-up roofing system work.

C. Insurance/Code Compliance: Install and test, where required, built-up roofing system to comply with governing regulations and the following insurance requirements
   1. UL Fire Classified and Class 90 uplift resistance.

D. Coordinate installing roofing sheets, flashings, stripping, coatings, and surfacings so that felts are not exposed to precipitation or exposed overnight. Provide cutoffs at end of each day’s work to cover exposed felts with a course of coated felt with joints and edges sealed with roofing cement. Remove cutoffs immediately before resuming work.
E. Asphalt Bitumen Heating: Heat and apply bitumen according to EVT Method as recommended by NRCA. Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT more than 1 hour prior to application. Discard bitumen that has been held at a temperature exceeding finished blowing temperature (FBT) for more than 3 hours. Determine flash point, FBT and EVT of bitumen, either by information from bitumen producer or by suitable tests. Determine maximum fire-safe handling temperature and do not exceed that temperature in heating bitumen. In no case heat bitumen to a temperature higher than 25 degrees Fahrenheit below flash point. Keep kettle lid closed except when adding bitumen.

F. Bitumen Mopping Weights: For interply mopping, and for other moppings except as otherwise indicated, apply bitumen between plies at the nominal rate of 23 pounds per roof square (plus or minus 20 percent on a total-job average basis).

G. Substrate Joint Penetrations: Do not allow bitumen to penetrate substrate joints and enter building or damage insulation, vapor retarders, or other construction. Where mopping is applied directly to a substrate, tape joints or, in the case of steep asphalt, hold mopping back 2 inches from both sides of each joint.

H. All terminations shall occur on solid blocking in the framing.

I. Cutoffs: At the end of each day’s roofing installation, protect exposed edge of incomplete work, including ply sheets. Provide temporary covering of 2 plies of No. 15 roofing felt set in full mopings of hot bitumen; remove at beginning of the next day’s work.

3.2 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer’s written instructions for installing roofing insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated and to shop drawings.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.

E. Install insulation with long joints of insulation in continuous straight lines with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4-inch with insulation.
   1. Cut and fit insulation within 1/4-inch of nailers, projections, and penetrations.

F. Adhered Insulation: Prime surface of wood deck with asphalt primer at a rate of 3/4 gal/100 sq. ft., unless a greater weight is required by roofing system manufacturer, and allow primer to dry. Set each layer of insulation in a solid mopping of hot roofing asphalt.
G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck according to roofing system manufacturer’s written instructions. Tape joints of cover boards.

3.3 BASE SHEET INSTALLATION

A. Prime surface of wood deck with asphalt primer at a rate of 3/4-gal./100 sq. ft. and allow primer to dry.

B. Install one lapped course of base sheet according to roofing system manufacturer’s written instructions, extending sheet over and terminating beyond cants. Mechanically fasten base sheet to substrate.

3.4 ROOF MEMBRANE INSTALLATION

A. Interply Sheet: Install the number and type of ply sheets (felts) required to match existing roofing system, lapped (shingled) amount specified to form a continuous, uniform membrane with continuous bitumen mopplings between sheets so that ply sheet does not touch ply sheet. As ply-sheet membrane is laid up, glaze-coat top surface with a 20 pounds per square mopping of same bitumen.

B. Aggregate Surfacing: Promptly after installing and testing roofing membrane, base flashing, and stripping, flood-coat roof surface with 60 lb/100 sq. ft. of hot roofing asphalt. While flood coat is hot and fluid, cast the following average weight of aggregate in a uniform course:
   1. Aggregate Weight: 400 lb/100 sq. ft.
   2. If aggregate surfacing is delayed, promptly apply glaze coat of hot roofing asphalt at a rate of 10 lb/100 sq. ft.

C. Walkway Pads: Install walkway pads where required to replace units affected by work of this project, using units of manufacturer’s standard size. Set walkway pads in additional flood coat of hot roofing asphalt.

3.5 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer’s written instructions and as follows
   1. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roof membrane at cants in a solid mopping of hot roofing asphalt.
   2. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roof membrane and 4 inches onto field of roof membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
   1. Seal top termination of base flashing.
D. Install stripping where metal flanges and edgings are set on built-up roofing according to roofing system manufacturer’s written instructions.
   1. Built-up Stripping: Install stripping of not less than 2 plies of roof membrane felt, setting each ply in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt, extended onto roof membrane 4 inches and 6 inches, respectively.

E. Roof Drains: Set 30 inch by 30 inch metal flashing in bed of asphalt roofing cement on completed built-up roofing membrane. Cover metal flashing with stripping, extending a minimum of 4 inches beyond edge of metal flashing onto field of roof membrane. Clamp roof membrane, metal flashing, and stripping into roof-drain clamping ring.
   1. Stripping Material: Install not less than 2 plies of roof membrane felt, each set in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt.

3.6 FIELD QUALITY CONTROL

A. The Owner will engage an independent testing and inspecting agency to perform field inspections and quality-assurance tests.
   1. Testing agency will prepare reports stating whether inspected and tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace roof membrane that inspections and test reports indicate does not comply with specified requirements.
   1. Repair roof membrane that does not comply with specified requirements by re-adhering test specimens back in place and by applying additional plies, equal to the original number of plies specified, over test specimens according to roofing system manufacturer’s written instructions.

C. Additional testing, at the Contractor’s expense, may be performed to determine that corrected Work complies with specified requirements.

D. Test Cuts: Before flood coating and surfacing built-up roofing membrane, test specimens will be removed to evaluate problems observed during quality-assurance inspections of roof membrane as follows
   1. Approximate quantities of components within roof membrane will be determined according to ASTM D3617.
   2. Test specimens will be examined for interply voids according to ASTM D3617 and to comply with NRCA requirements.

E. Final Roof Inspection: Arrange for roofing system manufacturer’s technical personnel to inspect roofing installation on completion and submit report to the Architect. Notify the Architect and Owner 48 hours in advance of the date and time of inspection.

3.7 PROTECTION AND CLEANING

A. Protect built-up roofing membrane from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Architect and Owner.
B. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion.

END OF SECTION
SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Miscellaneous sheet metal flashing and trim including repair of existing flashings, equipment curbs, and roof penetrations.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 05 50 00 - Metal Fabrications: For protection of dissimilar metals.
   2. Section 07 51 13 - Built-Up Asphalt Roofing: For repairs to existing built-up asphalt roofing system.
   3. Section 07 92 00 - Joint Sealants: Provision of joint sealers, caulks, and tape.
   4. Section 09 90 00 - Painting and Coating: For field painting and touch-up painting of factory finished materials.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials
   1. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. AWS - American Welding Society

C. SMACNA - Sheet Metal and Air Conditioning Contractors’ National Association

D. SSPC - The Society for Protective Coatings

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. Work of this Section shall physically protect built-up asphalt roofing, exterior plaster penetrations, wall and door openings, and joints to dissimilar materials 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.
   3. Flashing to be Installed: Provide complete flashing system for full extent of locations where flashing is shown to occur.
1.4 SUBMITTALS

A. Shop Drawings: Submit drawings showing material profile, jointing pattern, jointing details, intersections, fastening methods, flashings, terminations, and installation details prior to fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A653, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 20 gauge except as otherwise indicated.

B. 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. Reglets: Metal of type and profile indicated, compatible with flashing indicated, noncorrosive, as manufactured by Fry Reglet; Springlok; Hickman Engineered Systems.
   5. Metal Accessories: Provide sheet metal clips, cleats, 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.

C. Materials for Permanent Protection of Dissimilar Materials: As specified in Section 05 50 00.

D. Silicone Tape: As specified in Section 07 92 00.

2.2 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 a system manufacturer.
2. Join joints and miters as recommended by a system 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: 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. Finishes
1. Galvanized Sheet Metal: Factory finish G90, conforming to ASTM A653 and ASTM A924; after fabrication, touch-up abraded surfaces in accordance with Section 09 90 00.
2. Finish Painting: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conform with SMACNA procedures and methods of installation.

B. Where installation requires fabrication at the Project site, conform to applicable requirements of Article titled “Fabrication” in this Section.

C. Coordinate flashing finishes with waterproof products that will be in contact with flashing. Provide bonderized, acid wash, grip-lock, etc., flashings as required by adjoining product manufacturers. Flashings requiring a chemical wash will be prepared at site and prior to installation.

D. Install standard catalog products in accordance with manufacturer's instructions, unless otherwise indicated.

E. 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.
F. Apply flashing compound at slip joints or wherever metal-to-metal contact occurs and movement may be anticipated to occur.

G. Flashings: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

H. Silicone Tape: Tape joints prior to painting as specified in Section 09 90 00.

I. Cleaning Metal Surface Primer Ready: Cleaning products shall not contaminate adjacent materials. Factory clean where possible. Notify paint applicator when paint ready so as not to allow any oxidization to occur.

3.2 ADJUSTING

A. Replace damaged material with new.

3.3 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. Where flashing gauge conflicts between the Drawings and Specifications, provide the heavier gauge.

1. Base Flashing: Galvanized steel, 0.0276-inch thick (24 gauge).
2. Counterflashing: Galvanized steel, 0.0217-inch thick (26 gauge).
3. Equipment Support Flashing: Galvanized steel, 0.0276-inch thick (24 gauge).
4. Roof Penetration Flashing: Galvanized steel, 0.0276-inch thick (24 gauge).

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Firestopping and smoke seal materials.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
   1. Section 07 21 01 - Building Insulation: Provision of building insulation.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials
   2. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.


1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Through penetration firestopping systems or designs shall be the types tested in accordance with ASTM E814 or UL 1479 and listed by UL FRD or approved by FM P7825.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to CBC for fire resistance ratings and surface burning characteristics.

B. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through penetration firestop systems are installed per specified requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: 3M; Bio Fireshield; Hilti; General Electric; Specified Technologies Inc.
2.2 MATERIALS

A. Provide asbestos free firestopping material capable of maintaining an effective barrier against flame, gases, and temperature. Provide noncombustible firestopping that is nontoxic to human beings during installation or during fire conditions. Devices and equipment for firestopping service shall be UL FRD listed or FM P7825 approved for use with applicable construction, and penetrating items.

B. Fire Hazard Classification: Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less when tested in accordance with UL 723 or UL listed and accepted.

C. Firestopping Rating: Firestopping materials shall be UL FRD listed or FM-7825 approved for “F” and “T” ratings at least equal to fire rating of fire wall or floor in which penetrated openings are to be protected.


E. Slag Wool Fiber Board Safing Insulation: Semirigid boards designed for use as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag wool fibers with thermostetting resin binders to comply with ASTM C612, Type IA and IB; nominal density of 4 lb/cu. ft.; passing ASTM E136 for combustion characteristics; thermal resistivity of 4 degrees Fahrenheit x h x sq. ft./btu x in. at 75 degrees Fahrenheit.
   1. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to application, remove from surfaces dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting or required fire resistance of firestopping materials. Prepare surface as recommended by manufacturer.

3.2 APPLICATION

A. General
   1. Provide firestopping for conditions specified whether or not firestopping is indicated, and, if indicated, whether such material is designated as insulation, safing, or sealant.
   2. Do not install insulation specified in Section 07 21 01 in place of firestopping materials specified in this Section.

B. Install firestopping in accordance with UL FRD systems or FM P7825 designs, and as recommended by manufacturer. printed instructions of the UL BMD, manufacturer’s instructions, or architectural detail as indicated on the Systems and Applications Schedule.

C. Apply firestopping material in sufficient thickness to achieve rating to uniform density and texture.
D. Install material at the following locations:
   1. Around duct, cable, conduit, piping, and their supports that penetrate fire rated above grade floor slabs, interior partitions and exterior walls.
   2. Around openings and penetrations through fire rated ceiling assemblies.
   3. Around penetration of vertical fire rated service shafts.
   4. Around openings and penetrations through fire rated enclosures.
   5. Slip joints at construction of rated walls to floor ceilings.
   6. At other locations as indicated and/or required by building Code.

E. Install firestop with sufficient pressure to properly fill and seal openings to ensure effective smoke seal.

F. Insulated Pipes and Ducts: Cut and remove thermal insulation where pipes and ducts pass through firestoppings. Replace thermal insulation with material having equal thermal insulation characteristics and equal firestopping characteristics.

### 3.3 FIELD QUALITY CONTROL

A. Immediately notify the Architect if the specified firestopping systems cannot meet the requirements of the Specification.

B. All areas of work must be accessible until inspected by the Architect and the Owner’s applicable fire protection representative. Correct unacceptable firestops and provide additional inspection to verify compliance with this Specification at no additional cost.

END OF SECTION
SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Joint sealants and backing systems for the following locations:
1. Exterior and interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
   a. Perimeter joints of exterior and interior openings where indicated.
   b. Tile control and expansion joints.
   c. Perimeter joints of toilet fixtures.
   d. Other joints as indicated.
2. Interior joints in horizontal traffic surfaces as indicated below:
   a. Control and expansion joints in cast-in-place concrete slabs.
   b. Control and expansion joints in tile flooring.
   c. Other joints as indicated.
3. Acoustical sealant for concealed joints.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
1. Section 07 62 00 - Sheet Metal Flashing and Trim: Provision of sheet metal flashing and trim.
2. Section 09 29 00 - Gypsum Board: Provision of gypsum board.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials

B. CALGreen - California Green Building Standards, 2013 Edition

C. CFR - Code of Federal Regulations

D. EPA - Environmental Protection Agency

E. FS - Federal Specifications
   1. TT-S-1543B - Sealing Compound, Silicone Rubber Base.
1.3 **SYSTEM DESCRIPTION**

A. **Performance Requirements:** Provide joint sealers that have been manufactured to establish and maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. **Sealants used on the Project shall comply with CALGreen Code Nonresidential Mandatory Measures, Chapter 5, Division 5.5, Section 5.504, Article 5.504.4.1.**

1.4 **SUBMITTALS**

A. **Product Data:** Submit product data from manufacturers for each joint sealant product required.

B. **Samples for verification purposes of each type and color of joint sealant required.** Install joint sealant samples in 1/2-inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
   1. Submit samples of all standard colors of sealant which is not paintable.

**PART 2 - PRODUCTS**

2.1 **MATERIALS**

A. **General Requirements**
   1. Provide joint sealers compatible with one another and with substrates.
   2. **VOC Content of Interior Sealants:** Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Sealants: 250 g/L.
      b. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Manufacturer’s standard color range shall permit matching sealants to color of contacting surfaces and future ability to paint.

B. **Sealants and Caulks**
   1. **Type A - One Part Neutral Cure Silicone Sealant**
      a. ASTM C920, non-sag, one part, low modulus, elastomeric sealant.
      b. Color: As selected by the Architect.
   2. **Type B - Polyurethane Sealant, Two Component**
      a. ASTM C920, Type M; Grade P; Class 25; Use T having minimum ASTM D2240 Shore A hardness of 30 plus or minus 5.
      b. Color: As selected by the Architect.

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Contra Costa College                      Joint Sealants
C-633/PAC - Seismic Retrofit, Performing Arts Center    Bid Set - 3/18/2016
3. Type C - Silicone Sealant, Single Component
   a. FS TT-S-1543B, mildew resistant, chemical curing, non-sagging, non-staining, non-bleeding.
   b. Color: As selected by the Architect.

4. Type D - Acrylic Emulsion Sealant
   a. ASTM C834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
   b. Color: As selected by the Architect.

5. Type E - Acoustical Sealant
   a. Non-hardening, non-skinning, for use in conjunction with gypsum board.

2.2 ACCESSORIES

   A. Primer: Non-staining type recommended by sealant manufacturer to suit application.

   B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

   C. Joint Backing: ASTM D1056 round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width as recommended by manufacturer of sealant material.

   D. Backer Rod at Acoustical Sealant: Flexible closed cell, neoprene rod or polyethylene foam suitable for use as a backer to the acoustic sealant. Width of backer rod shall be a minimum of 30 percent greater and a maximum of 50 percent greater than the joint width.

   E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 INSTALLATION OF JOINT SEALANTS

   A. General: Comply with joint sealant manufacturer’s printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

   B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Installation of Sealant Joint Backings: Install sealant joint backings to comply with the following requirements:
   1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
      a. Do not leave gaps between ends of joint fillers.
      b. Do not stretch, twist, puncture, or tear joint fillers.
      c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
   2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints for 2 opposing side adhesion only.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

F. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
   1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer’s directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer’s recommendations.

3.2 SCHEDULE

A. Type A, Non-Sag
   1. Exterior and interior control and expansion joints in vertical surfaces of cast-in-place concrete.
   2. Between metal and concrete.
   3. Interior and exterior perimeter joints between cast-in-place concrete and frames of doors and windows.
   4. Control and expansion joints in exterior soffits and overhead surfaces.
B. Type B: Exterior control, expansion, and isolation joints in cast-in-place concrete slabs.

C. Type C
   1. Interior ceramic tile control and expansion joints.
   2. Perimeter joints of toilet fixtures.

D. Type D: All other interior joints not indicated otherwise.

E. Type E: Concealed acoustical conditions.

END OF SECTION
SECTION 08 11 10
STEEL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Non-fire resistance rated steel door frames.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
1. Section 08 14 16 - Flush Wood Doors: Provision of flush wood doors.
2. Section 08 71 00 - Door Hardware: Provision of door hardware.
3. Section 09 90 00 - Painting and Coating: For finish painting.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials

B. DHI - Door and Hardware Institute
1. A115 Series - Steel Door Preparation Standards.

C. SDI - Steel Door Institute
1. 100 - Recommended Specifications for Standard Steel Doors and Frames.
2. 105 - Recommended Erection Instructions for Steel Frames.
3. 112 - Galvanized Standard Steel Doors and Frames.
5. A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

D. UL - Underwriters Laboratories Inc.

1.3 SUBMITTALS

A. Product Data: Submit product data for each type of frame specified, including details of construction, materials, dimensions, hardware preparation, label compliance, sound ratings, profiles, and finishes.

B. Shop Drawings: Submit shop drawings showing fabrication and installation of standard steel frames referenced to the Architect’s door mark and hardware group. Include details of each frame type, conditions at openings, details of construction,
location and installation requirements of frame hardware and reinforcements, and
details of joints and connections. Show anchorage and accessory items.
1. Provide schedule of frames using same reference numbers for details and
openings as those on the Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Overly Manufacturing Co.; Steelcraft Manufacturing Co;
Stanley.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B; suitable
for exposed applications.
B. Hot-Rolled Steel Sheet: ASTM A1011, Commercial Steel (CS), Type B; free of
scale, pitting, or surface defects; pickled and oiled.
C. Supports and Anchors: Fabricate of not less than 18 gauge sheet steel; galvanized
where used with galvanized frames.
D. Inserts, Bolts, and Fasteners: Manufacturer’s standard units. Where items are to
be built in at exterior walls, hot-dip galvanize in compliance with ASTM A153, Class
C or D as applicable.
E. Shop Applied Paint: Apply after fabrication.
   1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as
      a base for specified finish paints.

2.3 MATERIALS

A. Interior Frames: Fabricate knock down frames of minimum 18 gauge cold-rolled
steel.
B. Door Silencers: Except on weatherstripped and smoke gasketed frames, drill stops
to receive 3 silencers on strike jambs of single door frames and 2 silencers on
heads of double door frames.

2.4 FABRICATION

A. Fabricate steel frame units to be rigid, neat in appearance and free from defects,
warp or buckle. Wherever practicable, fit and assemble units in manufacturer’s
plant. Clearly identify work that cannot be permanently factory-assembled before
shipment, to assure proper assembly at Project site. Comply with SDI A250.8
requirements.
B. Tolerances: Comply with SDI 117.
C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel.

D. Fabricate frames from galvanized sheet steel in accordance with SDI 112.

E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

F. Hardware Preparation: Prepare frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of DHI A115 Series Specifications for frame preparation for hardware.
   1. For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in head of frames, as applicable.

G. Reinforce frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at Project site.

H. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with DHI.

I. Shop Painting: Clean, treat, and paint exposed surfaces of steel frame units, including galvanized surfaces.
   1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
   2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

2.5 FINISHES

A. Finish Painting: As specified in Section 09 90 00.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel frames and accessories in accordance with final shop drawings, manufacturer’s data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated.
   1. Except for frames located at existing concrete, masonry, or drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3.2 ADJUST AND CLEAN

A. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
B. Final Adjustments: Check and readjust operating hardware items, leaving steel frames undamaged and in complete and proper operating condition.

END OF SECTION
SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Non-fire resistance rated flush solid core doors.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 08 11 10 - Steel Frames: Provision of steel frames.
   2. Section 08 71 00 - Door Hardware: For furnishing of finish hardware.
   3. Section 09 90 00 - Painting and Coating: For finish painting.

1.2 REFERENCES

A. AWI - Architectural Woodwork Institute

B. CALGreen - California Green Building Standards, 2013 Edition

C. DHI - Door and Hardware Institute
   2. WDHS-3 - Recommended Hardware Locations for Wood Flush Doors.

D. FSC - Forest Stewardship Council
   1. STD-01-001 - FSC Principles and Criteria for Forest Stewardship.

E. WDMA - Window and Door Manufacturers Association

F. UL - Underwriters Laboratories, Inc.

1.3 SYSTEM DESCRIPTION

A. Composite wood used on the Project shall comply with CALGreen Code Nonresidential Mandatory Measures, Chapter 5, Division 5.5, Section 5.504, Articles 5.504.4.5 and 5.504.4.5.3.

1.4 SUBMITTALS

A. Product Data: Submit product data for each type of door, including details of core and edge construction and factory-finishing specifications.

B. Shop Drawings: Submit shop drawings indicating location and size of each door referenced to the Architect’s door mark and hardware group, elevation of each kind of door, details of construction, location and extent of hardware blocking, requirements for factory finishing and other pertinent data.
1. For factory machined doors, indicate dimensions and locations of cutouts for locksets.

C. Samples for Verification: Corner sections of doors approximately 12 inches square with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required.

1.5 QUALITY ASSURANCE

A. Quality Standard: WDMA I.S.1-A.

B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

C. Forest Certification: Provide doors made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship”.

1.6 WARRANTY

A. General Warranty: Door manufacturer’s warranty specified in this Article shall not deprive the College of other rights the College may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer’s Warranty: Submit written agreement on door manufacturer’s standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4-inch in a 42 inch by 84 inch section or that show telegraphing of core construction in face veneers exceeding 0.01-inch in a 3 inch span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.

2. Warranty shall be in effect during the following period of time after date of Final Completion.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Algoma Hardwoods, Inc.; Eggers Industries, Architectural Door Division; Marshfield DoorSystems, Inc.

2.2 MATERIALS

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
B. Interior Solid Core Doors for Opaque Finish
   1. Faces: Birch veneer.
   2. Grade: Custom.
   3. Construction: 5 plies.
   5. Bonding: Stiles and rails bonded to core; then entire unit abrasive planed before veneering.
   6. Vertical Exposed Edges of Stiles: Solid stock, fire-retardant treated where required, same species as face of doors with no finger joints, knots, pitch pockets, or other defects.

C. Hardware: As specified in Section 08 71 00.

2.3 FABRICATION

A. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
   1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.

2.4 FINISHES

A. Field Painting: Opaque finish, as specified in Section 09 90 00.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: See Section 08 71 00.

B. Manufacturer’s Instructions: Install wood doors to comply with manufacturer’s instructions and referenced quality standard and as indicated.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Seal cut surfaces after fitting.
   1. Fitting Clearances for Non-Fire Resistance Rated Doors: Provide 1/8-inch at jambs and heads; 1/16-inch per leaf at meeting stiles for pairs of doors, and 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.
   2. Bevel non-fire resistance rated doors 1/8-inch in 2 inches at lock and hinge edges.

D. Finishing
   1. Before finishing doors, remove handling marks or effects of exposure to moisture with a complete, thorough final sanding over all surfaces of the door.
      a. Deep scratches shall be steamed out before sanding.
      b. Sharp edges shall be eased by sanding.
   2. Clean sanded doors before applying sealer or finish.
3. Seal around all cutouts with 2 coats of varnish or sealer before hardware is set into place.

E. Field Finished Doors: See Section 09 90 00.

3.2 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

END OF SECTION
SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Access doors and frames.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
   1. Section 09 90 00 - Painting and Coating: For finish painting.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer’s data completely describing products.

B. Shop Drawings: Submit drawings showing attachment to structure in each typical condition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS


2.2 MATERIALS

A. Non-Fire Rated
   1. Flush steel door and flanged frame for gypsum board walls and ceiling installations.
   2. Size: As indicated.

B. Fire Rated
   1. Fire rated flush steel door and flanged frame, UL 1-1/2 hour rated, self latching with direct action knurled knob, for installation in rated walls.

C. Finishes
   1. Steel: Chemically etch and apply baked-on rust inhibitive zinc dust prime coat.
   2. Finish Painting: As specified in Section 09 90 00.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install access doors in accordance with manufacturer’s instructions and at locations authorized by the Architect in accordance with requirements for work of other Sections. Install access doors to provide access to concealed control and isolation valves.

B. Securely attach frames to supporting work and ensure doors operate smoothly and are free from warp, twist, and distortion.

3.2 ADJUSTING AND CLEANING

A. Thoroughly clean surfaces of grease, oil, or other impurities, touch-up abraded prime coat, and otherwise prepare for finish painting where required.

END OF SECTION
SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following, but is not necessarily limited to:

1. Door Hardware, including electric hardware.
2. Storefront and Entrance door hardware.
3. Power supplies for electric hardware.
4. Low-energy door operators plus sensors and actuators.
5. Thresholds, gasketing and weather-stripping.
6. Door silencers or mutes.

C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.

1. Division 8: Section - Steel Frames.
2. Division 8: Section - Wood Doors.
3. Division 8: Section - Aluminum Storefront

1.03 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

A. 2013 California Building Code, CCR, Title 24.

B. BHMA – Builders’ Hardware Manufacturers Association

C. CCR – California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

D. DHI – Door and Hardware Institute


1. NFPA 80 - Fire Doors and Other Opening Protectives
2. NFPA 105 - Smoke and Draft Control Door Assemblies
F. UL - Underwriters Laboratories.
   1. UL 10C - Fire Tests of Door Assemblies
   2. UL 305 - Panic Hardware

G. WHI - Warnock Hersey Incorporated

H. SDI - Steel Door Institute

1.04 SUBMITTALS & SUBSTITUTIONS

A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.

B. Submit product data (catalog cuts) including manufacturers’ technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Submit six (6) copies of schedule organized vertically into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Include a Cover Sheet with;
   a. Job Name, location, telephone number.
   b. Architects name, location and telephone number.
   c. Contractors name, location, telephone number and job number.
   d. Suppliers name, location, telephone number and job number.
   e. Hardware consultant’s name, location and telephone number.

2. Job Index information included;
   a. Numerical door number index including; door number, hardware heading number and page number.
   b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
   c. Manufacturers’ names and abbreviations for all materials.
   d. Explanation of abbreviations, symbols, and codes used in the schedule.
   e. Mounting locations for hardware.
   f. Clarification statements or questions.
   g. Catalog cuts and manufacturer’s technical data and instructions.

3. Vertical schedule format sample:

<table>
<thead>
<tr>
<th>Heading Number 1 (Hardware group or set number – HW -1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 1 Single Door #1 - Exterior from Corridor 101</td>
</tr>
<tr>
<td>(b) 90°</td>
</tr>
<tr>
<td>(c) RH</td>
</tr>
<tr>
<td>(d) 3’ 0”x7’ 0” x 1-3/4” x (e) 20 Minute (f) WD x HM</td>
</tr>
</tbody>
</table>
(g) 1 (h) (i) ea  
(j) Hinges  - (k) 5BB1HW  4.5 x 4.5 NRP (l) ½ TMS

2 6AA 1 ea  
Lockset - ND50PD x RHO x RH x 10-025 x JTMS  626 SCH

(a) - Single or pair with opening number and location.  (b) - Degree of opening  (c) - Hand of door(s)  (d) - Door and frame dimensions and door thickness.  (e) - Label requirements if any.  (f) - Door by frame material.  (g) - (Optional) Hardware item line #.  (h) - Keyset Symbol.  (i) - Quantity.  (j) - Product description.  (k) - Product Number.  (l) - Fastenings and other pertinent information.  (m) - Hardware finish codes per ANSI A156.18.  (n) - Manufacture abbreviation.

D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.

E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.

F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.

I. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

1.05 QUALITY ASSURANCE

A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Responsible for detailing, scheduling and ordering of finish hardware.
2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing. To maintain the integrity of patented key systems provide a letter of authorization from the specified manufacturer indicating that supplier has authorization to purchase the key system directly from the manufacturer.

3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.

C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.06 DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.

B. Hardware items shall be individually packaged in manufacturers’ original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

D. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

1.07 WARRANTY

A. Provide warranties of respective manufacturers’ regular terms of sale from day of final acceptance as follows:

1. Locksets: “L” Series (3) years – “ND” Ten (10) years.
2. Electronic Locks: One (1) year.
3. Closers: Thirty (30) years –1260 twenty (20) years –Concealed High Security fifteen (15) years --except electronic closers shall be two (2) years.
4. Exit devices: Three (3) years.
5. All other hardware: Two (2) years.
1.08 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least one week prior to beginning work of this section.


C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

<table>
<thead>
<tr>
<th>Item</th>
<th>Manufacturer</th>
<th>Acceptable Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Hinges</td>
<td>Ives</td>
<td>Hager, Stanley</td>
</tr>
<tr>
<td>B. Locks, Latches &amp; Cylinders</td>
<td>Schlage</td>
<td>None District Standard</td>
</tr>
<tr>
<td>C. Exit Devices</td>
<td>Von Duprin</td>
<td>Or Approved Equal</td>
</tr>
<tr>
<td>D. Closers</td>
<td>LCN</td>
<td>Or Approved Equal</td>
</tr>
<tr>
<td>E. Push, Pulls &amp; Protection Plates</td>
<td>Ives</td>
<td>Trimco, BBW</td>
</tr>
<tr>
<td>F. Flush Bolts</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>G. Dust Proof Strikes</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>H. Coordinators</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>I. Stops</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>J. Overhead Stops</td>
<td>Glynn-Johnson</td>
<td>Or Approved Equal</td>
</tr>
<tr>
<td>K. Thresholds</td>
<td>National Guard</td>
<td>Pemko, Zero</td>
</tr>
<tr>
<td>L. Seals &amp; Bottoms</td>
<td>National Guard</td>
<td>Pemko, Zero</td>
</tr>
</tbody>
</table>
2.02 MATERIALS

A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.

1. Hinges shall be sized in accordance with the following:
   a. Height:
      1) Doors up to 42" wide: 4-1/2" inches.
      2) Doors 43" to 48" wide: 5 inches.
   b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
   c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.

2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.

B. Pivots: High strength forgings and castings with precision bearings for smooth operation. Positive locking vertical adjustment mechanism to allow installer to precisely position the door and balance the load.

C. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.

D. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Rhodes" design, fastened with through-bolts and threaded chassis hubs.

1. Locksets to comply with ANSI A156.2, Series 4000, Grade 1; tested to exceed 3,000,000 cycles. Locksets shall meet ANSI A117.1, Accessible Code.
2. Chassis: One piece modular assembly and multi-functional allowing function interchange without disassembly of lockset.
3. Spindle shall be deep-draw manufactured not stamped. Spindle and spring cage to be one-piece integrated assembly.
4. Anti-rotation plate to be interlocking to the lock chassis. Lock design utilizing bit-tabs are not acceptable.
5. Lever Trim: Accessible design, bi-directional, independent assemblies.
6. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
7. Thru-bolts to secure anti-rotation plate without sheer line. Fully threaded thru-bolts are not acceptable.
8. Spring cage to have double compression springs. Manufacturers utilizing torsion springs are not acceptable.
9. Latchbolt to be steel with minimum ½" throw deadlatch on keyed and exterior functions; ¾" throw anti-friction latchbolt on pairs of doors.
10. Strikes: ANSI curved lip, 1-1/4" x 4-7/8", with 1" deep dust box (K510-066). Lips shall be of sufficient length to clear trim and protect clothing.

E. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of ¼" diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt...
with hardened steel roller. Strike alloy deadbolt with re-inforcer and two 3” long screws. ANSI A156.5, 2001 Grade 1 certified.

F. Exit devices: Von Duprin as scheduled.

1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
3. Mechanism case shall have an average thickness of .140”.
4. Compression spring engineering.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners.
7. All latchbolts shall be deadlocking with ¾” throw and have a self-lubricating coating to reduce friction and wear.
8. Device shall bear UL label for fire and or panic as may be required.
9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
10. Lever Trim: “Breakaway” design, forged brass or bronze escutcheon with a minimum of .130” thickness, match lockset lever design.
12. Furnish glass bead kits for vision lites where required.
13. All Exit Devices to be sex-bolted to the doors.
14. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34” and 44” above the finished floor surface.
   a. The unlatching force shall not exceed 15 lbs. applied in the direction of travel.
   -OR-
   b. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.

G. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16” steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All
other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.

4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.

5. Closers shall be installed to permit doors to swing 180 degrees.

6. All closers shall utilize a stable fluid withstand temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.

7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.

8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb (CBC Section 11B-404.2.8.1).

9. Provide sex-bolted or through bolt mounting for all door closers.

H. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.

1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.

2. Provide dust proof strikes at openings using bottom bolts.

I. Door Stops:

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.

2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).

3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

J. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10” high and 2” LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
K. Thresholds: As Scheduled and per details.

1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 “Thermal and Moisture Protection”.
3. Use ¼” fasteners, red-head flat-head sleeve anchors (SS/FHSL).
4. Thresholds shall comply with CBC Section 11B-404.2.5.

L. Seals: Provide silicone gasket at all rated and exterior doors.

1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers’ and selected frame manufacturers’ requirements.
2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.

M. Door Shoes & Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.

N. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistant-rated door assemblies.

2.03 KEYING

A. Furnish a Proprietary Schlage Everest / Primus masterkey system as directed by the owner or architect. Key system to be designated and combined at the direction of the District Lockshop. Everest 29 / Primus at Exterior and Everest 29 at Interior.

B. Establish a new masterkey system for this project as directed by the keying schedule.

C. Furnish all cylinders in the Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI)

D. Furnish Patent Protected Schlage keys and cylinders on all locks.

E. Furnish construction keying for doors requiring locking during construction.

1. For FSIC systems provide 23-030-ICX Full Size Construction Cores
2. For FSIC systems provide ten 48-101-ICX Construction Keys
3. For FSIC systems provide two 48-056-ICX Control Keys (const.)
4. For FSIC systems provide two control keys for installing the permanent cores (49-003 for “Everest Conventional”, 48-005–XP for “Everest Primus”)
F. Furnish all keys with visual key control.
   1. Stamp key “Do Not Duplicate”.

G. Furnish mechanical keys as follows:
   1. Furnish 2 cut change keys for each different change key code.
   2. Furnish 1 uncut key blank for each change key code.
   3. Furnish 6 cut masterkeys for each different masterkey set.
   4. Furnish 3 uncut key blanks for each masterkey set.
   5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
   6. Furnish 1 cut control key cut to each SKD combination.

H. Furnish Key System Management Software (SM01-287 Windows on CD)
   I. Furnish Keying Transcript (50-123 in SM form) to owner for loading into key system software. End-user to provide letter of authorization to hardware dealer to allow Schlage to e-mail transcript (bitting list) to the end-user.

2.04 FINISHES

A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.

B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.

C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.

B. Screws for butt hinges shall be flathead, countersunk, full-thread type.

C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

D. Provide expansion anchors for attaching hardware items to concrete or masonry.

E. All exposed fasteners shall have a phillips head.

F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

**PART 3 - EXECUTION**

3.01 INSPECTION

A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer’s furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2013 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer’s instructions and requirements of DHI.

B. Use the templates provided by hardware item manufacturer.

C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34” and 44” AFF.

D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.

G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power.
transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.

I. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.

J. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer’s technical documentation.

3.03 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surface soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.

E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

A. Hardware supplier is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers’ instructions and as specified herein.
### 3.06 SCHEDULE

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. The Door Schedule on the Drawings indicates which hardware set is used with each door.

#### Manufacturers Abbreviations (Mfr.)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLY</td>
<td>Glynn-Johnson Corporation</td>
</tr>
<tr>
<td>IVE</td>
<td>Ives</td>
</tr>
<tr>
<td>LCN</td>
<td>LCN</td>
</tr>
<tr>
<td>NGP</td>
<td>National Guard Products</td>
</tr>
<tr>
<td>SCH</td>
<td>Schlage Lock Company</td>
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<td>Von Duprin</td>
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**SPEXTA: 212823**

#### HARDWARE GROUP NO. 01 - NEW THRESHOLD

FOR USE ON MARK/DOOR #(S):

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#### HARDWARE GROUP NO. 02 - EXISTING EXTERIOR DOOR / PANIC HARDWARE

FOR USE ON MARK/DOOR #(S):

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<td>MORTISE CYLINDER</td>
<td>20-061-ICX XQ11-948</td>
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<td>PERM CORE</td>
<td>20-740 EVEREST 29/PRIMUS</td>
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**NOTE: PATCH ANY EXPOSED DOOR PREP HOLES**
### HARDWARE GROUP NO. 03 - NO WORK AT THIS TIME

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### HARDWARE GROUP NO. 04 - EXISTING TO REMAIN

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### HARDWARE GROUP NO. 05 - EXTERIOR / COURTYARD / PANIC

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<td>626 SCH</td>
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<td>630 TRI</td>
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1  
BALANCE OF HARDWARE  
EXISTING  

HARDWARE GROUP NO. 08 - INTERIOR PAIR / RATED / STORAGE  
FOR USE ON MARK/DOOR #(S):  
24  30  

EACH TO HAVE:  

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HARDWARE GROUP NO. 09 - INTERIOR / RATED / LIGHT CHEEK  
FOR USE ON MARK/DOOR #(S):  
25  26  

EACH TO HAVE:  

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HARDWARE GROUP NO. 10 - INTERIOR / RATED / STAGE / PANIC HARDWARE  
FOR USE ON MARK/DOOR #(S):  
27  28  

EACH TO HAVE:  

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HARDWARE GROUP NO. 11 - INTERIOR / RATED / CUSTODIAN, ELEC, STORAGE, LIGHTING LAB  
FOR USE ON MARK/DOOR #(S):  
29  32  34  44  53  77  77A  80  

EACH TO HAVE:  

Contra Costa Community College District  
Contra Costa College  
C-633/PAC - Seismic Retrofit, Performing Arts Center  
Section 08 71 00 - Page 15 of 20  
Door Hardware  
Bid Set - 3/18/2016
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NOTE: DOOR 80 IS IN ORCHESTRA PIT

HARDWARE GROUP NO. 12 - INTERIOR PAIR / RATED / PRODUCTION GREEN RM

FOR USE ON MARK/DOOR #(S):
39

EACH TO HAVE:

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HARDWARE GROUP NO. 13 - INTERIOR / RATED / MEN, WOMEN

FOR USE ON MARK/DOOR #(S):
40 41

EACH TO HAVE:

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<td>LOCK FILLER</td>
<td>5022</td>
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NOTE: FILL THE DEADBOLT HOLE WITH A COVER PLATE

HARDWARE GROUP NO. 14 - INTERIOR / MAKE-UP

FOR USE ON MARK/DOOR #(S):
42 43

EACH TO HAVE:

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NOTE: FILL THE DEADBOLT HOLE WITH A COVER PLATE

HARDWARE GROUP NO. 15 - INTERIOR / RATED / OFFICE

FOR USE ON MARK/DOOR #(S):
51

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HARDWARE GROUP NO. 15A - INTERIOR / RATED / STORAGE

FOR USE ON MARK/DOOR #(S):
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HARDWARE GROUP NO. 16 - INTERIOR / RATED / MEN, WOMEN / EXISTING AUTO OPERATORS

FOR USE ON MARK/DOOR #(S):
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NOTE: FILL THE DEADBOLT HOLE WITH A COVER PLATE
HARDWARE GROUP NO. 17 - INTERIOR / RATED / PANIC HARDWARE

FOR USE ON MARK/DOOR #(S):
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HARDWARE GROUP NO. 18 - INTERIOR / COAT

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HARDWARE GROUP NO. 19 - INTERIOR / STORAGE, TOOL ROOM, STORAGE

FOR USE ON MARK/DOOR #(S):
83 84 85

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HARDWARE GROUP NO. 20 - INTERIOR / OFFICE

FOR USE ON MARK/DOOR #(S):
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END OF SECTION
Catalog Cuts

for

Contra Costa College PAC Seismic Retrofit

Sorted by Manufacturer

Prepared By
BOB MANTHEY, AHC
ALLEGIION, PLC
6689 OWENS DRIVE SUITE 200

PLEASANTON CA.
Phone 925-462-4777

Created 9/17/2015
## Catalog Cut Summary

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8121 Door Pull

Available mounting – K see page B16

Size
5-3/4”

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<th>Product No.</th>
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<th>Center to Center “B”</th>
<th>Overall Length “C”</th>
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<td>8121-5</td>
<td>3-1/2”</td>
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Finishes brass

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* Available with Antimicrobial Coating, use suffix AM

8190HD 90° Offset Door Pull

Available mounting – with heavy duty 3/8-16” mounting screws, standard H-I-L, N or O see page B15 and B17

Available Sizes
8”, 10”, 12”, 18”

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<th>Product No.</th>
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<th>Clearance “B”</th>
<th>Center to Center “C”</th>
<th>Overall Length “C”</th>
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<td>8190-0</td>
<td>3-1/4”</td>
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Finishes brass

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Finishes stainless steel

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</table>

* Available with Antimicrobial Coating, use suffix AM
Mounting for 8103EZ, 8190, 9100, 9103EZ, 9190 and 9264, 9265, 9266 and 9267 long door pulls.

- All mounting hardware is for standard 1-3/4" door.
- Consult Customer Service if other than standard.

**Type J/N Mount**

- Screw Sleeve
- Front Side (push)
- Rear Side (pull)
- (3) Set Screws at 90° apart

**Back to Back “Two-Anchor”**

Wood or Metal Door

Available only for 8103EZHD, 8190HD, 9100HD push/pull combinations and 9264, 9265, 9266 and 9267 long door pulls.

- (2) 3/8-16 x 2-3/4" steel countersunk trim head machine screws with (4) set screws for maximum anchoring force.
- (2) Steel screw sleeves; zinc plated.

**Type NS-Standard Push/Pull Mounting**

Type N & Standard

Pushbar to Pull

- (1) 3/8 - 16 X 3" steel countersunk trim head machine screws with (2) set screws.
- (1) steel screw sleeve, zinc plated.

Free End Pushbar & Pull

- (2) 3/8 - 16 X 2-1/4" brass, oval head machine screws; plated to match.
- (2) No. 14 countersunk washers; plated to match.

**Decorative Blind Thru - Bolt**

Wood or Metal Door

Available only for 8103EZHD, 8190HD and 9100HD Series Push/Pull Combinations.

- (2) 3/8-16 x 2-1/4" blind thru - bolts; plated to match.

**Type NO Push/Pull Mounting**

Type N & Type O

Pushbar to Pull

- (1) 3/8 -16 X 3" steel countersunk trim head machine screws with (2) set screws.
- (1) steel screw sleeve, zinc plated.

Free End Pushbar & Pull

- (2) 3/8 - 16 X 2-1/4" blind thru-bolts; plated to match.

**Type P Mount**

**1/2" Glass Door**

Available only for 8103EZHD, 8190HD, 9100HD, 9265 and 9266 long door pulls.

- (2) 3/8-16 x 2-1/4" steel countersunk trim head machine screws with (4) set screws for maximum anchoring force.
- (2) Steel screw sleeves; zinc plated
- (2) Metal and Vinyl washers
**Wall Bumpers**

**WS401CVX**  
Wall Bumpers

**WS401CCV**  
Wall Bumpers

**WS402CVX**  
Wall Bumpers

**WS402CCV**  
Wall Bumpers

- Constructed in heavy-duty cast brass.
- Special retainer cup makes rubber tamper resistant.

**WS401CVX** (401) – convex rubber bumper, packed with wood screw and plastic anchor.

**WS401CCV** (401-1/2) – concave rubber bumper which avoids damage to locks with projecting buttons, packed with wood screw and plastic anchor.

**WS402CVX** (402) – convex rubber bumper packed with screw and drywall anchor.

**WS402CCV** (402-1/2) – concave rubber bumper which avoids damage to locks with projecting buttons and is packed with screw and drywall anchor.

**Dimensions**

Base Diameter: 2-1/2”

Base Thickness: 3/8”

Overall Projection: 1”

**Finishes**

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</table>

**WS404CVX**  
Wall Bumpers

- Compact size.
- Constructed in cast brass.
- Totally concealed mounting discourages vandalism or tampering.
- Unit furnished with grey convex rubber bumper.
- Packed with sheet metal screw, rawl plug and brad.

**Dimensions**

Base Diameter: 1”

Overall Projection: 17/32”

**Finishes**

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<td>619</td>
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</tbody>
</table>
**8400 Series Protection Plates**

- Door protection plates are available in .050” thick brass, stainless steel or aluminum; and 1/8” thick high impact polyethylene in clear or black.
- Bevel edge options; specify B4E for all four edges.
- Mounting screw pack furnished standard, 16 screws per pack. Optional screw packs are available for TEK or TORK screw heads. Refer to the following chart for ordering.
- Specify NMH for no mounting holes. (Not available on 8402)
- Specify NMH-A for no mounting holes with adhesive. (Not available on 8402)
- Specify CS for counter sunk mounting holes.
- Specify ERS prepped with extra row of screws.

**Kickplate Gasket Tape** Tape is recommended when using a brass plate on a metal door to reduce tarnishing from electrolytic oxidation. One tape pack will cover an the perimeters of a 8” x 34” kickplate. Order 8401 Gasket Tape.

### 8400 Protection Plate

#### 8402 (UL)* Protection Plate

*UL mark appears in upper right corner. Factory supplied screws must be used.

Number of screw packs required by plate size (specify TEK Screws or TORK screws).

<table>
<thead>
<tr>
<th>22”-25”</th>
<th>26”-33”</th>
<th>34”-41”</th>
<th>42”-48”</th>
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<tr>
<td>4”-8”</td>
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<tr>
<td>9”-16”</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>17”-24”</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>25”-32”</td>
<td>1</td>
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<tr>
<td>33”-40”</td>
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<tr>
<td>41”-48”</td>
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**Finishes brass 24” x 48” max. size**

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**Finishes stainless steel**

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**Finishes aluminum**

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**Finishes plastic**

Clear and Black

*Residential Grade Kickplates available Carded only, finishes PA28, PA3, PA619, PA716, B3, B505, B619, B716*
# Protection Plates

## Mop Plates
- Protect the bottom of the pull side of door subject to cleaning and mopping procedures.
- Size Ranges: 4” to 6” high, 22” to 48” wide

## Kick Plates
- Protect the bottom of the push side of doors subject to scuffing from foot traffic.
- Recommended for all doors subject to normal use (especially doors using a closer).
- Size Ranges: 8” to 24” high, 22” to 48” wide

## Stretcher Plates
- Protect doors at specific areas where consistent contact is made by stretchers, service carts or other equipment.
- Usually applied to push side of doors.
- Specify “B4E” Option for beveled edges.
- Size Ranges: 6” to 8” high, 22” to 48” wide

## Armor Plates
- Protect lower half of doors from abuse by hard carts, trucks and rough usage.
- Usually applied to push side of single doors and both sides of double acting doors.
- Size Ranges: 26” to 48” high, 22” to 48” wide
**5BB1HW**  
5 Knuckle, Ball Bearing, Heavy Weight Full Mortise Hinge  
- For heavy weight doors  
- High frequency usage  
- 4 ball bearing  
- Packed with wood and metal screws

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<th>Options</th>
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<td>• NRP, Non-Removable Pin</td>
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<tr>
<td>• SH, Security Stud</td>
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<td>• HT, Hospital Tip</td>
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<tr>
<td>• RC, Round Corners - 1/4&quot; or 5/8&quot; Radius</td>
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<tr>
<td>• SEC, Security Fastners - Pin-in-Socket</td>
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**5BB1WT**  
5 Knuckle, Ball Bearing, Wide Throw Full Mortise Hinge  
- For medium weight doors  
- Medium frequency usage  
- 2 ball bearing  
- Packed with wood and metal screws

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<td>• HT, Hospital Tip</td>
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**Finishes**  
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ND-Series

The toughest cylindrical lock for heavy-duty commercial applications.

At Schlage we know that every product you specify has to stand up to constant use and abuse without compromising security. The ND-Series gets the job done with tough, dependable ANSI Grade 1 locks designed for use in schools, hospitals, offices, retail spaces, and colleges and universities. Built for heavy duty applications, ND-Series locks are easy to service and maintain, are available with our exclusive Vandlgard® technology, and offer a wide range of styles and finishes to fit your project needs.

Pictured here: Sparta lever shown in 626 Satin Chrome

We don’t compromise on security.

The safety and security of your clients’ buildings is something we take very seriously. That’s why every Schlage lock and deadbolt undergoes intensive testing to determine its ANSI grade level:

- Cycle tests
- Resistance tests
- Door impact tests
- Warped door tests
- Bolt strength tests

We pay attention to these details so you can focus on creating a functional and aesthetically pleasing environment for your clients. In fact, every one of our ND-Series locks meets ANSI Grade 1 standards for safety.
ND Series

The Schlage ND Series is the toughest cylindrical lock we make. That means you get premium durability and performance in a lock that’s also easy to service and maintain. And because we test our locks beyond the standards required by ANSI, you know that you’re getting a product you can count on to withstand the use and abuse that come with heavy duty commercial applications.

Pictured here: Athens lever shown in 626 Satin Chrome
Built to perform without fail.

- Tested to at least four times the 800,000-cycle ANSI Grade 1 requirement
- Exceeds ANSI A156.2, Series 4000 Grade 1 locked lever torque requirements
- The only cylindrical lock available with our exclusive Vandlgard® technology

ND-Series with Vandlgard

The ND-Series Vandlgard is ideal for areas subject to abuse or anywhere vandalism is likely to be present, such as schools, universities, offices and commercial/public buildings. Vandlgard prevents damage to internal lock components caused by excessive force from hitting or standing on the lever to gain access. Vandlgard functions maintain total key system and architectural design compatibility with Schlage’s regular ND-Series cylindrical locks.
Lever Designs

**Athens**

Symbol: ATH (L-Series 07)
Material: Pressure cast zinc lever; wrought brass rose

**Rho**

Symbol: RHO (L-Series 06)
Material: Pressure cast zinc lever; wrought brass rose

**Sparta**

Symbol: SPA (L-Series 17)
Material: Pressure cast zinc lever; wrought brass rose

**Omega**

Symbol: OME (L-Series Omega)
Material: Pressure cast zinc lever; wrought brass rose

**Tubular**

Symbol: TLR (L-Series 03)
Material: Pressure cast zinc lever; wrought brass rose

**Tactile Warning**

**Milled**

Order as follows:
- 8AT for Athens
- 8RO for Rhodes
- 8SP for Sparta

**Knurled**

Order as follows:
- 8TR for Tubular

Only available on outside lever, unless otherwise specified

All designs shown in 626 Satin Chrome

- Standard cylinder
- FSIC - Full size interchangeable core option
- SFIC - Small format interchangeable core option
- Meets California code for 1/2” or less return to the door
- Complies with ADA Accessibility Guidelines
- Antimicrobial coating available on 626 finish only
- Extended factory lead time
**Lever Finishes**

<table>
<thead>
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<th></th>
<th>605 Bright Brass</th>
<th>606 Satin Brass</th>
<th>612 Satin Bronze</th>
<th>613 Oil Rubbed Bronze</th>
<th>619 Satin Nickel</th>
<th>625 Bright Chromium Plated</th>
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**ND SERIES LOCKS**

<table>
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<th>NEW IN 2009</th>
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<td>Sparta</td>
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<tr>
<td>Tubular</td>
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**Door Handing**

All ND levers are reversible. Hand information is necessary to ensure proper cylinder orientation in keyed functions, and finish of latchbolt and strike for locks that are to be installed on reverse bevel doors. Follow the diagram to correctly determine the hand of the door.

**ADA-Compliant Products**

In compliance with the American National Standards Institute (ANSI A117.1) and the Americans with Disabilities Act (ADA), Schlage Lock Company offers a wide selection of locks designed for the needs of the physically challenged. This act is designed to provide protection for people with disabilities.

The intent of ADA is that owners of certain types of buildings must remove barriers and provide people with disabilities with access equal to, or similar to, that available to the general public.

Product information and specifications contained in this catalog are subject to change without notice. Please consult the factory.
### Lock Functions | ANSI A156.2 Series 4000 Grade 1

#### Non-Keyed Locks

<table>
<thead>
<tr>
<th>SCHLAGE</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND10S</td>
<td>F75</td>
</tr>
</tbody>
</table>

**Passage Latch**
- Both levers always unlocked.

<table>
<thead>
<tr>
<th>SCHLAGE</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND12D</td>
<td>F89</td>
</tr>
</tbody>
</table>

**Exit Lock**
- Outside lever always fixed.
- Inside lever always unlocked.

<table>
<thead>
<tr>
<th>SCHLAGE</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND12DEL</td>
<td>-</td>
</tr>
</tbody>
</table>

**Electrified**
- Outside lever continuously locked electrically.
- Unlocked by switch or power failure.
- Auxiliary latch deadlocks latchbolt when door is closed.
- Inside lever always free for immediate exit.

<table>
<thead>
<tr>
<th>SCHLAGE</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND12DEU</td>
<td>-</td>
</tr>
</tbody>
</table>

**Electrically Locked (Fail Safe)**
- Outside lever continuously locked until unlocked by electric current.
- Auxiliary latch deadlocks latchbolt when door is closed.
- Inside lever always free for immediate exit.

<table>
<thead>
<tr>
<th>SCHLAGE</th>
<th>ANSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND25D</td>
<td>-</td>
</tr>
</tbody>
</table>

**Exit Lock**
- Blank plate outside.
- Inside lever always unlocked.
Keyed Locks

**Bath/Bedroom Privacy Lock**
- Push-button locking.
- Can be opened from outside with a small screwdriver.
- Turn inside lever or close door to release button.

**Hospital Privacy Lock**
- Push-button locking.
- Unlocked from outside by turning emergency turn-button.
- Turn inside lever or close door to release button.

**Single Dummy Trim**
- Dummy trim for one side of door.
- Used for door pull or as matching inactive trim.

**Entrance/Office Lock**
- Push-button locking.
- Push-button locks outside lever until it is unlocked with key or by turning inside lever.

**Vestibule Lock**
- Latch retracted by key from outside when the outside lever is unlocked by key in inside lever.
- Inside lever is always unlocked.

**Store Lock**†
- Key in either lever locks or unlocks both levers.

**Classroom Lock**
- Outside lever locked and unlocked by key.
- Inside lever always unlocked.

---

† Caution: Double cylinder locks are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

Safe School Locks.

FSIC - full size interchangeable core option.
SFIC - small format interchangeable core option.

Standard cylinder.
### Keyed Locks

**Corridor Lock**
- Locked or unlocked by key from outside.
- Push-button locking from inside.
- Turn inside lever or close door to release button.
- When outside lever is locked by key it can only be unlocked by key.
- Inside lever is always unlocked.

**Classroom Security Lock**
- Key in either lever locks or unlocks outside lever.
- Inside lever is always unlocked.

**Storeroom Lock**
- Outside lever is fixed.
- Entrance by key only.
- Inside lever always unlocked.

**Electrically Locked (Fail Safe)**
- Outside lever continuously locked electrically.
- Unlocked by key outside or by switch or power failure.
- Auxiliary latch deadlocks latchbolt when door is closed.
- Inside lever always free for immediate exit.

### Vandlgard Functions

**Institution Lock**
- Both levers are fixed.
- Entrance by key in either lever.

**Faculty Restroom Lock**
- Outside lever is fixed.
- Entrance by key only.
- Push-button in inside lever activates visual occupancy indicator, allowing only emergency master key to operate.
- Turn inside lever or close door to release visual occupancy indicator.
- Rotation of inside spinner-button provides lock-out feature by keeping indicator thrown.

**Entrance/Office Lock**
- Push-button locking.
- Push-button disengages outside lever until locked with key or by turning inside lever.
- Vandlgard is designed to disengage outside spindle from latch when locked.
### Entrance Lock
- Turn/push-button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked.
- Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Vestibule Lock
- Latch retracted by key from outside when outside lever is disengaged by key in inside lever.
- Inside lever is always unlocked.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Classroom Lock
- Outside lever disengaged and unlocked by key.
- Inside lever always unlocked.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Classroom Security Lock
- Key in either lever locks or unlocks outside lever.
- Inside lever is always unlocked.

### Storeroom Lock
- Outside lever always disengaged.
- Entrance by key only.
- Inside lever is always unlocked.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Electrically Locked (Fail Safe)
- Outside lever continuously disengaged electrically.
- Unlocked by key or by switch or power failure.
- Auxiliary latch deadlocks latchbolt when door is closed.
- Inside lever always free for immediate exit.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Electrically Unlocked (Fail Secure)
- Outside lever continuously disengaged until unlocked by key or electric current.
- Auxiliary latch deadlocks latchbolt when door is closed.
- Inside lever always free for immediate exit.
- Vandlgard is designed to disengage outside spindle from latch when locked.

### Corridor Lock
- Locked or unlocked by key from outside.
- Push-button locking from inside.
- Turning inside lever or closing door releases button.
- When outside lever is locked by key it can only be unlocked by key.
- Inside lever is always unlocked.
- Vandlgard is designed to disengage outside spindle from latch when locked.

† **Caution:**
Double cylinder locks are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.
Specifications

Handing:
All ND-Series lever locksets are non-handed.

Door Thickness:
15/8” to 21/8” (41mm–54mm) standard including Vandlgard® functions. 13/4” - 2” for function D85. See accessories (Page 21) for spacers required for 13/8” doors.

Backset:
23/4” (70 mm) standard. 23/8”, 33/4” and 5” (60 mm, 95 mm, 127 mm) optional.

Faceplate:
Brass, bronze or stainless steel. 1 1/8” x 2 1/4” (29 mm x 57mm) square corner, beveled.

Lock Chassis:
Zinc plated for corrosion resistance.

Latch Bolt:
Steel, 1/2” (12mm) throw, deadlocking on keyed and exterior functions. 3/4” (19 mm) throw anti-friction latch available for pairs of fire doors.

Exposed Trim:
Levers: Pressure cast zinc, plated to match finish symbols.
Roses: Brass, bronze or zinc.

Strike:
ANSI curved lip strike 1 1/4” x 4 7/8” x 1 3/16”lip to center standard. Optional strikes, lip lengths and ANSI strike box available. See page 21.

Cylinder & Keys:
6-pin Everest C123 keyway standard with two patented nickel silver keys per lock.

Keying Options:
Interchangeable core and Primus high security cylinders.
Master keying, grand master keying and construction keying.

Warranty:
Seven-year limited for all functions including Vandlgard.

Certifications

ANSI:
Meets or exceeds A156.2 Series 4000, Grade 1 strength and operational requirements. Meets A117.1 Accessibility Code.

Federal:

California State Reference Code:
(Formerly Title 19, California State Fire Marshal Standard) All levers with less than 1/2” (64mm) returns comply; Schlage levers return to within 1/2” of door face.

MEA Certification:
All electrified locking (fail-safe, unlocked by switch or power failures) functions accepted for use in New York City by the City of New York, Department of Buildings (MEA 24-04-E).

All levers with less than 1/2” (64mm) returns comply with California Fire Safety Codes.

Florida Building Commission:
3/4” and 1/2” throw latch approved for Hurricane Resistance with Miami-Dade County, Florida.

UL / cUL:
All locks listed for A label single doors, 4’ x 8’. Letter F and UL symbol.

ADA Compliant:
Schlage Lock Company offers a wide selection of locks designed to meet the Americans With Disabilities Act.

Door Preparation
Full Size Interchangeable Core Availability

A-Series
Orbit design

AL-Series
Saturn design

B500-Series

B600 / 700-Series

D-Series knob
Orbit design

ND-Series lever
all designs

H-Series knob
Orbit design

L-Series
all designs
except concealed

S-Series
all designs
except Flair

S200-Series
all designs for S210

All except Flair for other functions
Full Size Interchangeable Core Cylinders for Schlage Locksets

**Full Size Core Only**

<table>
<thead>
<tr>
<th>Number</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-030</td>
<td>Conventional core</td>
</tr>
<tr>
<td>30-120</td>
<td>Conventional core for hotel function (specify hand)</td>
</tr>
<tr>
<td>20-740-XP</td>
<td>Primus XP core (not available in hotel function)</td>
</tr>
</tbody>
</table>

Available 606 and 626 finish only. Order control keys separately.

**Full Size IC Housings for Bored Deadlocks, Less Core**

<table>
<thead>
<tr>
<th>Lockset Series</th>
<th>Description</th>
<th>Number</th>
<th>Specify Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>B500-Series</td>
<td>Outside</td>
<td>B610-203, B610-205</td>
<td>605, 609, 612, 613, 619, 625, 626, and 716</td>
</tr>
<tr>
<td></td>
<td>Inside</td>
<td>B610-028**</td>
<td>605, 609, 612, 613, 619, 625, 626, and 716</td>
</tr>
<tr>
<td>B250, H, S200-Series</td>
<td>Outside</td>
<td>22-061</td>
<td>605, 606, 609, 610, 611, 612, 613, 616, 625, 626</td>
</tr>
<tr>
<td></td>
<td>Inside of B252</td>
<td>22-062</td>
<td></td>
</tr>
<tr>
<td>B600 / 700-Series</td>
<td>Outside</td>
<td>B610-027</td>
<td>605, 606, 609, 612, 613, 625, 626</td>
</tr>
<tr>
<td></td>
<td>Inside</td>
<td>B610-028</td>
<td>See Note Below</td>
</tr>
</tbody>
</table>

Specify finish of B610-031 inside snap-on faceplate ordered separately for BC162 and B662/762.

**Full Size Interchangeable Core Padlocks**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Shackles Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>LESS CYLINDER - FULL SIZE INTERCHANGEABLE CORE</td>
<td></td>
</tr>
<tr>
<td>BRASS BODY</td>
<td></td>
</tr>
<tr>
<td>KS43A3200</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>KS43D3200</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>KS43F3200</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>KS43G3200</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>STEEL BODY</td>
<td></td>
</tr>
<tr>
<td>KS72M3200</td>
<td>7/16&quot;</td>
</tr>
<tr>
<td>KS72F3200</td>
<td>7/16&quot;</td>
</tr>
<tr>
<td>KS92M3200</td>
<td>1/4&quot;</td>
</tr>
</tbody>
</table>

Note: To order Primus XP add the suffix - XP to the Primus part number. (Example: 12-345-XP)

KS43F  
KS72F  
KS92M
## Full Size Interchangeable Core Mortise Cylinders

### Cylinders for Schlage L-Series Mortise Locks

<table>
<thead>
<tr>
<th>Design</th>
<th>Function</th>
<th>Core Mechanism</th>
<th>Housing Less Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>L &amp; N Escutcheons</td>
<td>All Except Below</td>
<td>Conventional, Primus, Primus XP</td>
<td>30-007</td>
</tr>
<tr>
<td>L9060P Outside</td>
<td>30-008</td>
<td>20-798, 20-798-XP</td>
<td></td>
</tr>
<tr>
<td>L9485, L9486P Hotel Functions</td>
<td>30-010*</td>
<td>N/A</td>
<td>30-007</td>
</tr>
<tr>
<td>Sectional Trim</td>
<td>All Except Below</td>
<td>30-138</td>
<td>30-137</td>
</tr>
<tr>
<td>L9060P Outside</td>
<td>30-030</td>
<td>20-776, 20-776-XP</td>
<td></td>
</tr>
<tr>
<td>L9485, L9486P Hotel Functions</td>
<td>30-040*</td>
<td>N/A</td>
<td>30-137</td>
</tr>
</tbody>
</table>

* Hotel function cores are handed. Specify hand of door.

### Notes
1. Mortise cylinders available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
3. All cylinders are 1 1/2” long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.

### Mortise Cylinders with Straight Cam for Exit Devices

<table>
<thead>
<tr>
<th>Number</th>
<th>Core Mechanism</th>
<th>Collar</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-091</td>
<td>Conventional core</td>
<td>Compression ring &amp; spring</td>
</tr>
<tr>
<td>20-061</td>
<td>1/8” blocking rings + compression ring &amp; spring</td>
<td></td>
</tr>
<tr>
<td>20-763, 20-763-XP</td>
<td>Primus/Primus XP core</td>
<td>Compression ring &amp; spring</td>
</tr>
<tr>
<td>20-771, 20-771-XP</td>
<td>1/8” blocking rings + compression ring &amp; spring</td>
<td></td>
</tr>
<tr>
<td>20-059</td>
<td>Housing less core</td>
<td>None</td>
</tr>
<tr>
<td>26-064</td>
<td></td>
<td>Compression ring &amp; spring</td>
</tr>
</tbody>
</table>

### Notes
1. Available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
3. All cylinders are 1 1/2” long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.
### Full Size Interchangeable Core Cylinders for Exit Devices, Aluminum Doors, etc.

![Image of a cylinder](image)

#### Interchangeable Core Rim Cylinders for Exit Devices

<table>
<thead>
<tr>
<th>Number</th>
<th>Core Mechanism</th>
<th>Collar</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-057</td>
<td>Conventional core</td>
<td>Compression ring &amp; spring</td>
</tr>
<tr>
<td>20-757</td>
<td>Primus core</td>
<td></td>
</tr>
<tr>
<td>20-757-XP</td>
<td>Primus XP core</td>
<td></td>
</tr>
<tr>
<td>20-079</td>
<td>Housing only, less core</td>
<td></td>
</tr>
</tbody>
</table>

Available 605, 606, 609, 610, 612, 613, 625 and 626 finish.

#### Cylinders for Adams Rite M5 and 4700 Series

Lori 4500 Series and Corbin Russwin DL3000 Series

<table>
<thead>
<tr>
<th>Number</th>
<th>Core Mechanism</th>
<th>Collar</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-091</td>
<td>Conventional core</td>
<td>1/8” + 1/8” blocking rings</td>
</tr>
<tr>
<td>20-722</td>
<td>Primus core</td>
<td>1/8” + 1/8” blocking rings</td>
</tr>
<tr>
<td>20-722-XP</td>
<td>Primus XP core</td>
<td>1/8” + 1/8” blocking rings</td>
</tr>
<tr>
<td>20-090</td>
<td>Housing less core</td>
<td>None</td>
</tr>
</tbody>
</table>

These cylinders include set screw pack B220-050 for Adams Rite locks.

#### Notes

1. Mortise cylinders available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest).
3. All cylinders are 1 1/2” long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.
33A and 35A for all types of single and double doors with mullion, UL listed for Panic Exit Hardware. Devices are ANSI A156.3 – 2001 Grade 1. The 35A has a smooth mechanism case and the 33A has grooved case. The rim device is non-handed except when the SS (Signal Switch) option is used. See opposite page for available outside trim and device functions.

33A/35A fits door stiles as narrow as 1 ¾" (44mm). Newly designed device has a one piece center case cover.


Specifications

<table>
<thead>
<tr>
<th>Device Lengths</th>
<th>3'  2'4&quot; to 3' (711mm to 914 mm) Door Size</th>
<th>4'  2'10&quot; to 4' (864 mm to 1219 mm) Door Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strikes</td>
<td>1439 – Dull Black</td>
<td>Optional Strikes – see page 20</td>
</tr>
<tr>
<td>Dogging Feature</td>
<td>Hex key dogging standard</td>
<td></td>
</tr>
<tr>
<td>Dogging Options</td>
<td>CD  Cylinder Dogging,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LD  Less Dogging</td>
<td>see page 26</td>
</tr>
<tr>
<td>Electric Options</td>
<td>LX  Latchbolt Monitor Switch</td>
<td>see page 22</td>
</tr>
<tr>
<td></td>
<td>RX  Pushpad Monitor Switch</td>
<td>see page 22</td>
</tr>
<tr>
<td></td>
<td>RX2 Double Pushpad Monitor Switch</td>
<td>see page 22</td>
</tr>
<tr>
<td></td>
<td>SS  Signal Switch</td>
<td>see page 23</td>
</tr>
<tr>
<td></td>
<td>EL  Electric Latch Retraction</td>
<td>see page 23</td>
</tr>
<tr>
<td></td>
<td>ALK Alarm Exit Kit</td>
<td>see page 22</td>
</tr>
<tr>
<td>Miscellaneous Options</td>
<td>PN  Pneumatic Latch Retraction</td>
<td>see page 26</td>
</tr>
<tr>
<td></td>
<td>GBK Glass Bead Kit</td>
<td>see page 27</td>
</tr>
<tr>
<td>Fasteners &amp; Sex Bolts (SNB)</td>
<td>Includes 1 ¾&quot; (44mm) – 2 ¼&quot; (57mm) Wood &amp; Metal Doors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>#425 SNB furnished standard for end case</td>
<td></td>
</tr>
<tr>
<td></td>
<td>#325 SNB furnished standard for EO (exit only device)</td>
<td></td>
</tr>
<tr>
<td>Latch Bolt</td>
<td>Deadlocking, ¾&quot; (19mm) throw</td>
<td></td>
</tr>
<tr>
<td>Device Centerline from Finished Floor</td>
<td>39 13/16&quot; (1011 mm)</td>
<td>39 11/16&quot; (1008 mm) with Mullion</td>
</tr>
<tr>
<td>Center Case Dimensions</td>
<td>8 ¾&quot; x 2 13/32&quot; x 1 9/16&quot; (208mm x 62mm x 40mm)</td>
<td></td>
</tr>
<tr>
<td>Mechanism Case Dimensions</td>
<td>2 ¼&quot; x 2 ¼&quot; (57mm x 57mm)</td>
<td></td>
</tr>
<tr>
<td>Projection</td>
<td>Pushbar Neutral – 3 13/16&quot; (97 mm)</td>
<td>Pushbar Depressed – 3 ¼&quot; (78 mm)</td>
</tr>
</tbody>
</table>

See page 31 for How to Order specification
VON DUPRIN. 33A/35A Strike/Stile Information

Strike Application/Minimum Stile

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Standard Single door</th>
<th>Double door Strike/Stile</th>
<th>Optional Single door</th>
<th>Double door Strike/Stile</th>
</tr>
</thead>
<tbody>
<tr>
<td>33A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35A</td>
<td>1439</td>
<td>1 7/8&quot; (44mm)</td>
<td>299</td>
<td>2 3/4&quot; (70mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1410</td>
<td>1 7/8&quot; (44mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1606</td>
<td>2 1/2&quot; (64mm)</td>
</tr>
<tr>
<td>327A</td>
<td>266 (Top)</td>
<td>1 7/8&quot; (44mm)</td>
<td>327A-F</td>
<td>299F (Top)</td>
</tr>
<tr>
<td>3527A</td>
<td>304L (Bottom)</td>
<td>1 7/8&quot; (44mm)</td>
<td>327A-F</td>
<td>304L (Bottom)</td>
</tr>
<tr>
<td></td>
<td>248L-4 (Bottom)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3327A-F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3327A-LBR-F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3347A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3547A</td>
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<td></td>
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<tr>
<td>3348A</td>
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<tr>
<td>3548A</td>
<td></td>
<td></td>
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<tr>
<td>3347A-F</td>
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<tr>
<td>3547A-F</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>3347A-LBR</td>
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</tr>
<tr>
<td>3547A-LBR</td>
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<td></td>
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<td>3548A-LBR</td>
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<tr>
<td>3347A-LBR-F</td>
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<tr>
<td>3547A-LBR-F</td>
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</tbody>
</table>

*Mullion information — Refer to the General and Auxiliary Catalog.

Strikes for Rim Devices

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Standard Single door</th>
<th>Double door Strike/Stile</th>
<th>Optional Single door</th>
<th>Double door Strike/Stile</th>
</tr>
</thead>
<tbody>
<tr>
<td>299</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1408</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1410 — Integral Stop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1439</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1606</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1609</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Strikes for Vertical Rod Devices

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Standard Single door</th>
<th>Double door Strike/Stile</th>
<th>Optional Single door</th>
<th>Double door Strike/Stile</th>
</tr>
</thead>
<tbody>
<tr>
<td>260U — Flush Transom Only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>266</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>299</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>299F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>304L</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>338</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>385A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>499F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For rim/vertical rod combination — consult factory.

2005 Ingersoll-Rand. May be copied for use with specification submittal.
### Product Description

<table>
<thead>
<tr>
<th>Exit Only</th>
<th>Dummy Trim</th>
<th>Night Latch</th>
<th>Night Latch</th>
</tr>
</thead>
<tbody>
<tr>
<td>33A-E0</td>
<td>33A-DT</td>
<td>33A-NL</td>
<td>33A-NL-OP</td>
</tr>
<tr>
<td>35A-E0</td>
<td>35A-DT</td>
<td>35A-NL</td>
<td>35A-NL-OP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trim Description</th>
<th>33A-E0</th>
<th>33A-DT</th>
<th>33A-NL</th>
<th>33A-NL-OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>386DT</td>
<td>386NL</td>
<td>388</td>
<td></td>
</tr>
</tbody>
</table>

| Base Size        | —      | 7½" x 1¾" w x ¾" d (190x43x22mm) | 7½" x 1¾" w x ¾" d (190x43x22mm) | 7½" x 1¾" w x ¾" d (190x43x22mm) |
| Grip Size        | —      | 8½" x 4¾" w x 3" d (216x110mm)    | 8½" x 4¾" w x 3" d (216x110mm)    | —                                  |
| Projection       | —      | 2½" (62mm)                        | 2½" (62mm)                        | 1" (25mm)                          |

| ANSI Function    | 01     | 02     | 03     | 03       |

| Cylinder Type    | —      | Rim    | Rim    | X550DT   |

| Optional Trim (See page 19) | — | x360L-DT | x550DT | x IVES 8190 10" |

### Lever

**Key Locks and Unlocks**

<table>
<thead>
<tr>
<th>Leverage Blank Escutcheon (No Cylinder)</th>
<th>Thumbturn (No Cylinder)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Description</td>
<td>33A-L</td>
</tr>
<tr>
<td>Trim Description</td>
<td>360L</td>
</tr>
<tr>
<td>Base Size</td>
<td>7½&quot; x 1¾&quot; w x ¾&quot; d (190x43x22mm)</td>
</tr>
<tr>
<td>Grip Size</td>
<td>—</td>
</tr>
<tr>
<td>Projection</td>
<td>3 (76mm)</td>
</tr>
<tr>
<td>ANSI Function</td>
<td>08 or 09 Field Selectable</td>
</tr>
<tr>
<td>Cylinder Type</td>
<td>1¼&quot; Mortise</td>
</tr>
<tr>
<td>Optional Trim (See page 19)</td>
<td>—</td>
</tr>
</tbody>
</table>

**Note:** 360L & 360T used on Wood Door require the 33A-WDA cover plate

For optional trims and functions see page 19
Lever Design Options

To order, specify:
1. Use suffix lever number, example 3327A-L x 03.

Operation Options — 360 Series Lever and Thumbturn

Standard operation, key locks and unlocks lever or thumbturn. Use dogged* mortise cylinder straight cam. (Classroom)

Night latch operation, lever or thumbturn retracts latch for NL function. Use undogged* mortise cylinder straight cam. (Storeroom)

Blank escutcheon, lever or thumbturn always active. Use BE suffix, i.e., 360L-BE. (Passage)

Blank Escutcheon, rigid lever. Use DT suffix, i.e., 360L-DT.

Operation Options — 374T/376T Series Thumbturn Control

Standard operation, key locks and unlocks thumbturn. Optional operation, key unlocks thumbturn, re-locks when key is removed. This operation is created by changing the cylinder plate included with control. Use 1½" mortise cylinder with a straight cam. Schlage cam reference B502-191.

* See page 28 for mortise cylinder information.

E360 Series Controls

Options:
- Available in all device finishes
- 24VDC Solenoid.....(.5 amp draw)
- Fail Safe (FS) or Fail Secure (FSE)
- Blank Escutcheon (BE) only

The E360 series controls provide the same choice of lever or thumbturn control of the 33A/35A series exit device series. Additionally, these trims have the advantage of being electrically controllable by a remote switching device, an access control system or automatic fire alarm system. The trim operates with a rotary solenoid that controls the locking cam the same way the standard cylinder works. These trims are available as –BE (Blank Escutcheon) function only. These trims are designed for use with the rim, surface vertical and concealed vertical 33A/35A device series.

To order, specify:
1. FSE or FS
2. Handing (Lever control)
3. EPT-2 Power Transfer or Electric Hinge will be used
The exit device that requires only 5 lbs. of force to operate

The AX was born out of a need to provide the market with a solution that meets the 2010 ADA Standards for Accessible Design (Chapters 404.2.7 and 309.4) that state the force required to activate operable parts shall be 5 lbs. maximum. The 2013 California Building Code (Chapter 11B-309.4) adopted virtually identical requirements that went into effect January 1st, 2013.

Since pioneering the first exit device in 1908, Von Duprin life safety products have provided unparalleled quality, performance and flexibility for schools, hospitals, stadiums and public buildings. These products come with the support and customer care only offered by Von Duprin. Providing the confidence and peace of mind at critical moments of life safety.

AX device specification requirements

Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, [OPTION for specific compliant products/applications: UL certified to meet maximum 5 pound requirements according to the 2010 ADA Standards for Accessible Design (Chapters 404.2.7 and 309.4) and California Building Code (Chapter 11B-309.4)] and UL listed for Panic Exit or Fire Exit Hardware.

How to identify the Von Duprin AX device

1. Look for the “AX” Prefix in the door schedule and/or specification.
2. In the field, look for the Compliance note on the UL Label and the AX Device Label. Both labels can be found on the center case cover of the exit device as shown below.

Contact Allegion today at 888.925.4359 or ax.allegion.com to learn how the AX device can help you provide accessibility without compromise.
AX98/99 Series Specifications

<table>
<thead>
<tr>
<th>Device types</th>
<th>AX98/99 - Rim</th>
</tr>
</thead>
<tbody>
<tr>
<td>AXXP98/99 - Rim</td>
<td></td>
</tr>
<tr>
<td>AX98/9927 - LBR</td>
<td></td>
</tr>
<tr>
<td>AX98/9949 WDC-LBL</td>
<td></td>
</tr>
<tr>
<td>AX98/9949 LBL &amp; LBL-AFL</td>
<td></td>
</tr>
</tbody>
</table>

- Concealed Vertical Cable Less Bottom Latch

<table>
<thead>
<tr>
<th>Device functions</th>
<th>EO, DT, NL, NLOP, L, LBE, LDT, LBE, LNL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Device lengths</th>
<th>3' / 4'</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electric options</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL - Electric latch retraction</td>
</tr>
<tr>
<td>LX - Latchbolt monitor switch</td>
</tr>
<tr>
<td>LXL - Latchbolt monitor switch low current</td>
</tr>
<tr>
<td>LXR - Latchbolt pushpad monitor</td>
</tr>
<tr>
<td>LXRXL - Latchbolt pushpad monitor low current</td>
</tr>
<tr>
<td>RX - Pushpad monitor switch</td>
</tr>
<tr>
<td>RXL - Pushpad monitor switch low current</td>
</tr>
<tr>
<td>RX2 - Double pushpad monitor switch</td>
</tr>
<tr>
<td>ALK - Alarm kit</td>
</tr>
<tr>
<td>SS - Signal switch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical options</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBK - Glass bead kit</td>
</tr>
<tr>
<td>-2 - Double cylinder</td>
</tr>
<tr>
<td>SNB - Sex bolts</td>
</tr>
<tr>
<td>SEC - Security screws</td>
</tr>
<tr>
<td>WP - Weep holes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dogging options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex key dogging = Standard</td>
</tr>
<tr>
<td>CD - Cylinder dogging</td>
</tr>
<tr>
<td>DI - Dogging indicator</td>
</tr>
<tr>
<td>LD - Less dogging</td>
</tr>
<tr>
<td>SD - Special dogging</td>
</tr>
</tbody>
</table>

(Panic only)

AX94/95 Series Specifications

<table>
<thead>
<tr>
<th>Device types</th>
<th>AX94/9547</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Device functions</th>
<th>EO, DT, L, LDT, LBE, LNL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Device lengths</th>
<th>3' / 4'</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electric options</th>
</tr>
</thead>
<tbody>
<tr>
<td>LX - Latchbolt monitor switch</td>
</tr>
</tbody>
</table>

AX33/35A Series Specifications

<table>
<thead>
<tr>
<th>Device types</th>
<th>AX33/35A - Rim</th>
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</thead>
<tbody>
<tr>
<td>AX33/35A49 LBL &amp; LBL-AFL</td>
<td></td>
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</tbody>
</table>

- Concealed Vertical Cable Less Bottom Latch

<table>
<thead>
<tr>
<th>Device functions</th>
<th>EO, DT, NL, NLOP, L, LBE, LDT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Device lengths</th>
<th>3' / 4'</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electric options</th>
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</thead>
<tbody>
<tr>
<td>EL - Electric latch retraction</td>
</tr>
<tr>
<td>LX - Latchbolt monitor switch</td>
</tr>
<tr>
<td>LXL - Latchbolt monitor switch low current</td>
</tr>
<tr>
<td>LXR - Latchbolt pushpad monitor</td>
</tr>
<tr>
<td>LXRXL - Latchbolt pushpad monitor low current</td>
</tr>
<tr>
<td>RX - Pushpad monitor switch</td>
</tr>
<tr>
<td>RXL - Pushpad monitor switch low current</td>
</tr>
<tr>
<td>RX2 - Double pushpad monitor switch</td>
</tr>
<tr>
<td>ALK - Alarm kit</td>
</tr>
<tr>
<td>SS - Signal switch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical options</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBK - Glass bead kit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dogging options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex key dogging = Standard</td>
</tr>
<tr>
<td>CD - Cylinder dogging</td>
</tr>
<tr>
<td>LD - Less dogging</td>
</tr>
</tbody>
</table>

(Panic only)

AX22 Series Specifications

<table>
<thead>
<tr>
<th>Device types</th>
<th>AX22 - Rim</th>
</tr>
</thead>
<tbody>
<tr>
<td>AX22227 - LBR</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Device functions</th>
<th>EO, DT, NL, NLOP, L, LBE</th>
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</table>

<table>
<thead>
<tr>
<th>Device lengths</th>
<th>3' / 4'</th>
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</table>

<table>
<thead>
<tr>
<th>Rating</th>
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</table>

<table>
<thead>
<tr>
<th>Electric options</th>
</tr>
</thead>
<tbody>
<tr>
<td>LX - Latchbolt monitor switch</td>
</tr>
<tr>
<td>RX - Pushpad monitor switch</td>
</tr>
<tr>
<td>RX2 - Double pushpad monitor switch</td>
</tr>
<tr>
<td>ALK - Alarm kit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical options</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBK - Glass bead kit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dogging options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex key dogging = Standard</td>
</tr>
<tr>
<td>CD - Cylinder dogging</td>
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</tbody>
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(Panic only)

<table>
<thead>
<tr>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALK - Alarm Kit</td>
</tr>
<tr>
<td>GBK - Glass Bead Kit</td>
</tr>
<tr>
<td>SNB - Sex Bolts</td>
</tr>
</tbody>
</table>

# Ordering information

**AX98/99 Series**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Series</th>
<th>Device type</th>
<th>Function</th>
<th>Rating</th>
<th>Suffix</th>
<th>Finish</th>
<th>Door Width</th>
<th>Handing</th>
<th>Trim</th>
<th>Lever Style</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>AX</td>
<td>98</td>
<td>Rim</td>
<td>Surface Vertical Rod</td>
<td>Panic</td>
<td>N/A</td>
<td>RHR</td>
<td>3'</td>
<td>US26D</td>
<td>06</td>
<td>010333</td>
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**AX94/95 Series**

<table>
<thead>
<tr>
<th>Device Type</th>
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<tbody>
<tr>
<td>N/A</td>
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<td>27</td>
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<tr>
<td>47</td>
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<tr>
<td>49</td>
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</tbody>
</table>

**AX33/35A Series**

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO</td>
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<tr>
<td>DT</td>
</tr>
<tr>
<td>NL</td>
</tr>
<tr>
<td>NLOP</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>LBE</td>
</tr>
<tr>
<td>LDT</td>
</tr>
<tr>
<td>LNL</td>
</tr>
</tbody>
</table>

**AX22 Series**

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO</td>
</tr>
<tr>
<td>DT</td>
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**AX94/95 Series**

<table>
<thead>
<tr>
<th>Device Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>27</td>
</tr>
<tr>
<td>47</td>
</tr>
<tr>
<td>49</td>
</tr>
</tbody>
</table>

**AX33/35A Series**

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO</td>
</tr>
<tr>
<td>DT</td>
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</table>

**AX22 Series**

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO</td>
</tr>
</tbody>
</table>

# Selecting the Right AX Device

1. **Prefix**
   - **AX** Accessible Device
   - **EL** Electric latch retraction
   - **LX** Latchbolt Monitor Switch
   - **LXL** Latchbolt Monitor Switch Low Current
   - **LXR** Latchbolt Pushpad Monitor
   - **LXRXL** Latchbolt Pushpad Monitor Low Current
   - **RX** Pushpad Monitor Switch
   - **RXL** Pushpad Monitor Switch Low Current
   - **RX2** Double Pushpad Monitor Switch
   - **SS** Signal Switch

   *Must be specified; may select more than one prefix.

2. **Series**
   - **98** Series 98 - smooth
   - **99** Series 99 - grooved
   - **94** Series 94 - smooth
   - **95** Series 95 - grooved
   - **33A** Series 33A - grooved
   - **35A** Series 35A - smooth
   - **22** Series 22

# Accessories

- **ALK** Alarm Kit
- **GBK** Glass Bead Kit
- **SNB** Sex Bolts

# Contact Allegion

Contact Allegion today at 888.925.4359 or ax.allegion.com to learn how the AX device can help you provide accessibility without compromise.
Pneumatic Controlled Exit Devices—PN

The PN feature provides remote latch bolt retraction in hazardous areas where electrically operated devices would not be permitted. The pneumatic solenoid will retract the latch bolt for momentary or prolonged periods. PN exit devices are particularly suited for use with automatic door operators. The PN feature is available on both Panic and Fire Exit Hardware devices.

The PN feature includes a special actuating linkage that gives building owners the option of mechanically or pneumatically dogging the exit device. If manual hex-key dogging is required, specify HD-PN (Dogging the device, whether mechanically or pneumatically, makes the device function as a push/pull unit and reduces the wear on its moving parts.)

When activated pneumatically, the latch bolt(s) of the exit device retract in 1/4 to 1 1/2 seconds. This pneumatic operation uses air pressure ranging from 50 to 100 pounds per square inch.

This product will function only when it is part of a pneumatic system (air compressor, air lines, pneumatic system, etc.). Contact LCN for correct control boxes.

To Order, Specify:
- Standard — Use prefix PN, example PN33ANL
- Hex Key Dogging — Use prefix HD-PN, example HD-PN33ANL

Less Dogging — LD

Less Dogging is available in all 33A/35A Panic Exit devices to remove the dogging option.

To Order, Specify:
- Use prefix LD, example LD33AL

Cylinder Dogging — CD

Cylinder dogging is available on all 33A/35A Panic Exit devices to replace the standard hex key dogging. Unit requires a standard 1 1/4” (32mm) mortise cylinder with a straight cam (Schlage Cam B502-191 reference).

To Order, Specify:
- Use prefix, CD, example CD33AL

Cylinder Dogging Kit — CDK

For field conversion, a cylinder dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99CDK or 35A/98CDK, specify finish.

Hex Key Dogging Kit — HDK

For field conversion, a hex key dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99HDK or 35A/98HDK, specify finish.

Dummy Pushpad

The 330 dummy pushpad is designed as a companion unit for all 33A devices. The 350 dummy pushpad is a companion unit for all 35A devices. The pushpad is rigid or nonfunctioning. A push/pull operation can be accomplished by using 386DT, 360L-DT, 550DT, 392-6 trim or any Ives Pull.

The 330/350 can be equipped with a functional pushpad and will accommodate an RX switch. Specify RX-330. May also be equipped with the RX2, double RX switch. Specify RX2-330

To order, specify:
1. 330 or 350.
2. Size 3’ or 4’ (914mm or 1219mm)
**98 and 99 rim exit devices** for all types of single and double doors with mullion, UL listed for Panic Exit Hardware. Devices are ANSI A156.3 – 2001 Grade 1. The 98 device has a smooth mechanism case and the 99 device has a grooved case. The rim device is non-handed except when the following device options are used: SD (Special Dogging), -2 (Double Cylinder) or SS (Signal Switch). See Opposite page for available outside trim and device functions. Covers stock hollow metal doors with 86 or 161 cutouts on single doors (may cover cutouts on pairs – consult template).


### Specifications

<table>
<thead>
<tr>
<th>Device Functions</th>
<th>Device ships EO/DT/NL. Field selectable. For TP,K, or L remove NL drive screw from device</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device Lengths</strong></td>
<td>3’ 2’4” to 3’ (711mm to 914 mm) Door Size</td>
</tr>
<tr>
<td></td>
<td>4’ 2’10” to 4’ (864 mm to 1219 mm) Door Size</td>
</tr>
<tr>
<td><strong>Strikes</strong></td>
<td>299 – Dull Black</td>
</tr>
<tr>
<td></td>
<td>Optional Strikes – see page 39</td>
</tr>
<tr>
<td><strong>Dogging Feature</strong></td>
<td>Hex key dogging standard</td>
</tr>
<tr>
<td><strong>Dogging Options</strong></td>
<td>CD Cylinder Dogging see page 48</td>
</tr>
<tr>
<td></td>
<td>SD Special Center Case Dogging see page 48</td>
</tr>
<tr>
<td></td>
<td>LD Less Dogging see page 48</td>
</tr>
<tr>
<td><strong>Electric Options</strong></td>
<td>LX Latchbolt Monitor Switch see page 42</td>
</tr>
<tr>
<td></td>
<td>RX Pushpad Monitor Switch see page 42</td>
</tr>
<tr>
<td></td>
<td>RX2 Double Pushpad Monitor Switch see page 42</td>
</tr>
<tr>
<td></td>
<td>E Electric Locking &amp; Unlocking see page 44</td>
</tr>
<tr>
<td></td>
<td>EL Electric Latch Retraction see page 43</td>
</tr>
<tr>
<td></td>
<td>SS Signal Switch see page 43</td>
</tr>
<tr>
<td></td>
<td>CX Chexit Delayed Exit see page 45</td>
</tr>
<tr>
<td></td>
<td>ALK Alarm Exit Kit see page 42</td>
</tr>
<tr>
<td><strong>Miscellaneous Options</strong></td>
<td>PN Pneumatic Latch Retraction see page 48</td>
</tr>
<tr>
<td></td>
<td>-2 Double Cylinder see page 48</td>
</tr>
<tr>
<td></td>
<td>GBK Glass Bead Kit see page 49</td>
</tr>
<tr>
<td><strong>Fasteners &amp; Sex Bolts (SNB)</strong></td>
<td>Includes 1 ¼&quot; (19mm) – 2 ¼&quot; (57mm) Wood &amp; Metal Doors</td>
</tr>
<tr>
<td></td>
<td>Optional SNB available for device, see next page for quantities</td>
</tr>
<tr>
<td><strong>Latch Bolt</strong></td>
<td>Deadlocking, ¾&quot; (19mm) throw</td>
</tr>
<tr>
<td><strong>Device Centerline from Finished Floor</strong></td>
<td>39 15/32&quot; (1011 mm)</td>
</tr>
<tr>
<td></td>
<td>39 11/64&quot; (1008 mm) with Mullion</td>
</tr>
<tr>
<td><strong>Center Case Dimensions</strong></td>
<td>8&quot; x 2 3/4&quot; x 2 3/8&quot; (203mm x 70mm x 60mm)</td>
</tr>
<tr>
<td><strong>Mechanism Case Dimensions</strong></td>
<td>2 1/8&quot; x 2 1/4&quot; (57mm x 57mm)</td>
</tr>
<tr>
<td><strong>Projection</strong></td>
<td>Pushbar Neutral – 3 15/64&quot; (97 mm)</td>
</tr>
<tr>
<td></td>
<td>Pushbar Depressed – 3 1/8&quot; (78 mm)</td>
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See page 53 for How to Order specification
Strikes for rim devices

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<th>Projection</th>
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<tbody>
<tr>
<td>264</td>
<td>9/16&quot; (14mm)</td>
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<tr>
<td>299</td>
<td>13/16&quot; (21mm)</td>
<td></td>
</tr>
<tr>
<td>299F</td>
<td>13/16&quot; (21mm)</td>
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<tr>
<td>499F</td>
<td>15/16&quot; (24mm)</td>
<td></td>
</tr>
<tr>
<td>1408</td>
<td>1/2&quot; (13mm)</td>
<td>One pair of doors</td>
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<tr>
<td>1439</td>
<td>1/2&quot; (13mm)</td>
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Strikes for vertical rod devices

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<thead>
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<th>Projection</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>248L-4</td>
<td>3/8&quot; (10mm)</td>
<td></td>
</tr>
<tr>
<td>260U</td>
<td>3/8&quot; (10mm)</td>
<td></td>
</tr>
<tr>
<td>299</td>
<td>13/16&quot; (21mm)</td>
<td></td>
</tr>
<tr>
<td>299F</td>
<td>13/16&quot; (21mm)</td>
<td></td>
</tr>
<tr>
<td>304L</td>
<td>13/16&quot; (21mm)</td>
<td></td>
</tr>
<tr>
<td>338</td>
<td>5/8&quot; (16mm)</td>
<td></td>
</tr>
<tr>
<td>385A</td>
<td>2-1/2&quot; (64mm)</td>
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Strikes for mortise lock devices

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<thead>
<tr>
<th>Strike</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>575</td>
<td>For use on 11/4&quot; (44mm) or 21/4&quot; (57mm) double door with coordinator.</td>
</tr>
<tr>
<td>575-2</td>
<td>For use on 11/4&quot; (44mm) thick double door with coordinator and astragal</td>
</tr>
<tr>
<td>576A</td>
<td>Open back strike for 11/4&quot; (44mm) thick double doors without coordinator.</td>
</tr>
<tr>
<td>576B</td>
<td>Open back strike for 21/4&quot; (57mm) thick double doors without coordinator.</td>
</tr>
<tr>
<td>11/4&quot;</td>
<td>Not for use with astragals</td>
</tr>
<tr>
<td>11/4&quot;</td>
<td>Not for use on wood doors</td>
</tr>
<tr>
<td>11/4&quot;</td>
<td>Acceptable for 90 minute pair of hollow metal doors</td>
</tr>
</tbody>
</table>
**98/99™ Rim Exit Device Standard Trim**

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Exit only</th>
<th>Dummy Trim</th>
<th>Night Latch</th>
<th>Night Latch</th>
</tr>
</thead>
<tbody>
<tr>
<td>98EO 99EO</td>
<td>98DT 99DT</td>
<td>98NL 99NL</td>
<td>98NL-OP 99NL-OP</td>
<td></td>
</tr>
</tbody>
</table>

| Trim Description | — | 990DT | 990NL-R/V | 110NL-MD 110NL-WD |
|———|———|———|———|———|

| Escutcheon Plate Size | — | 3" x 14\(\frac{1}{8}\)" x \(\frac{3}{8}\)" (76x360x2mm) | 3" x 14\(\frac{1}{8}\)" x \(\frac{3}{8}\)" (76x360x2mm) | — |
|———|———|———|———|———|

| Pull Center to Center | — | 5\(\frac{1}{2}\)" (140mm) | 5\(\frac{1}{2}\)" (140mm) | — |
|———|———|———|———|———|

| Projection | — | 2" (51mm) | 2" (51mm) | — |
|———|———|———|———|———|

| ANSI Function | 01 | 02 | 03 | 03 |
|———|———|———|———|———|

| Cylinder Type | — | — | Rim | Rim |
|———|———|———|———|———|

| Optional Trim (See pages 32 – 34) | x990EO x992EO x994EO x996EO | x991K-DT x992L-DT x994L-DT x996L-DT x696DT x697DT | x991K-NL x992L-NL x994L-NL x996L-NL x696NL x697NL |
|———|———|———|———|———|

| Optional #425 Sex Bolt Quantity for Device | 6 | 2 | 2 | 6 |
|———|———|———|———|———|

**For optional trims and functions see pages 32-34**
Pneumatic Controlled Exit Devices—PN

The PN feature provides remote latch bolt retraction in hazardous areas where electrically operated devices would not be permitted. The pneumatic solenoid will retract the latch bolt for momentary or prolonged periods. PN exit devices are particularly suited for use with automatic door operators. The PN feature is available on both Panic and Fire Exit Hardware devices.

The PN feature includes a special actuating linkage that gives building owners the option of mechanically or pneumatically dogging the exit device. If manual hex-key dogging is required, specify HD-PN (Dogging the device, whether mechanically or pneumatically, makes the device function as a push/pull unit and reduces the wear on its moving parts.) If cylinder dogging is required, the standard cylinder dogging is not available, but special center case dogging is available, specify SD-PN. SD-PN is not available on the 9875 or 9975 devices.

When activated pneumatically, the latch bolt(s) of the exit device retract in ½ to 1 ½ seconds. This pneumatic operation uses air pressure ranging from 50 to 100 pounds per square inch.

This product will function only when it is part of a pneumatic system (air compressor, air lines, pneumatic system, etc.). Contact LCN for correct control boxes.

To Order, Specify:
- Standard — Use prefix PN, example PN99NL
- Hex Key Dogging — Use prefix HD-PN, example HD-PN99NL
- Special Center Case Dogging — Use prefix SD-PN, example SD-PN99NL

Double Cylinder – 2

Double cylinder features an inside key cylinder which locks or unlocks the outside trim and an outside key cylinder which retracts the latch bolt only (Night Latch Function). Available on rim or mortise lock device.

Rim requires two rim type cylinders. Mortise device requires 1 rim cylinder and 1 mortise cylinder 1 ¼” with a straight cam. (Schlage cam reference B502-191.)

Available functions are thumbpiece, knob or lever.

To Order, Specify:
1. Suffix-2 with device/trim number, example 99TP-2.
2. Handing required, LHR or RHR.

Less Dogging – LD

Less Dogging is available in all 98/99™ Panic Exit devices to remove the dogging option.

To Order, Specify:
- Use prefix LD, example LD99L

Special Center Case Dogging – SD

Special cylinder dogging in the center case is available for Chexit, EL, ALK panic devices to allow for mechanical push/pull operation. With this option, the latchbolt is held retracted and pushbar is still operable. Specify handing — RHR or LHR.

SD requires 1 ¼” (32mm) mortise cylinder with a straight cam. (Schlage cam reference B502-191.)

Note: Available on Rim and Vertical Rod Panic Exit Devices only.

To Order, Specify:
- Use prefix SD, example SD99L

Cylinder Dogging — CD

Cylinder dogging is available on all 98/99™ Panic Exit devices to replace the standard hex key dogging. Unit requires a standard 1 ¼” (32mm) mortise cylinder with a straight cam (Schlage Cam B502-191 reference).

To Order, Specify:
- Use prefix, CD, example CD99L

Cylinder Dogging Kit — CDK

For field conversion, a cylinder dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99CDK or 35A/98CDK, specify finish.

Hex Key Dogging Kit — HDK

For field conversion, a hex key dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99HDK or 35A/98HDK, specify finish.

Braille, Embossed and Knurled Touchpads

Braille touchpad is embossed with the message “CAUTION STAIRWELL” in braille and raised letters provides assistance to person with impaired vision. Letters are ½” (13mm) high and braille is #2, raised height is ⅛” (2mm). Other messages are available on special order, limited to 20 characters per line.

Embossed touchpad is embossed with the word “PUSH” Knurled touchpad is to provide warning to person with impaired vision.
98-F and 99-F rim fire exit devices for all types of single doors up to 4’ x 10’ (1219mm x 3048mm) or 8’ x 10’ (2438mm x 3048mm) double doors with 9954 or 9854 mullion, UL listed for Fire Exit Hardware. See page 41 for detailed information on UL listed fire exit hardware label and door opening size information. Devices are ANSI A156.3 – 2001 Grade 1. The 98-F device has a smooth mechanism case and the 99-F device has a grooved case. The rim device is non-handed except when the following device options are used: -2 (Double Cylinder) or SS (Signal Switch). See Opposite page for available outside trim and device functions.


### Specifications

<table>
<thead>
<tr>
<th>Device Functions</th>
<th>Device ships EO/DT/NL. Field selectable. For TP,K,or L remove NL drive screw from device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Lengths</td>
<td>3’ 2’4” to 3’ (711mm to 914 mm) Door Size 4’ 2’10” to 4’ (864 mm to 1219 mm) Door Size</td>
</tr>
<tr>
<td>Strikes</td>
<td>299F – Dull Black, 499F with Mullions Optional Strikes – see page 39</td>
</tr>
<tr>
<td>Dogging Feature</td>
<td>No Mechanical Dogging, EL option available</td>
</tr>
<tr>
<td>Electric Options</td>
<td>LX Latchbolt Monitor Switch see page 42 RX Pushpad Monitor Switch see page 42 RX2 Double Pushpad Monitor Switch see page 42 E Electric Locking &amp; Unlocking see page 44 EL Electric Latch Retraction see page 43 SS Signal Switch see page 43 CX Chexit Delayed Exit see page 45 ALK Alarm Exit Kit see page 42</td>
</tr>
<tr>
<td>Miscellaneous Options</td>
<td>PN Pneumatic Latch Retraction see page 48 -2 Double Cylinder see page 48 GBK Glass Bead Kit see page 49</td>
</tr>
<tr>
<td>Fasteners &amp; Sex Bolts (SNB)</td>
<td>Includes 1 ¼” (19mm) – 2 ¼” (57mm) Wood &amp; Metal Doors Optional SNB available for device, see next page for quantities Optional SLM Blocking Pkg for wood doors with SLM blocking SNB required for wood doors, unless SLM Blocking Pkg specified</td>
</tr>
<tr>
<td>Latch Bolt</td>
<td>Deadlocking, ¾” (19mm) throw</td>
</tr>
<tr>
<td>Device Centerline from Finished Floor</td>
<td>39 13/32” (1011 mm) 39 11/16” (1008 mm) with Mullion</td>
</tr>
<tr>
<td>Center Case Dimensions</td>
<td>8” x 2 3/4” x 2 3/4” (203mm x 70mm x 60mm)</td>
</tr>
<tr>
<td>Mechanism Case Dimensions</td>
<td>2 1/4” x 2 1/4” (57mm x 57mm)</td>
</tr>
<tr>
<td>Projection</td>
<td>Pushbar Neutral – 3 15/32” (97 mm) Pushbar Depressed – 3 1/16” (78 mm)</td>
</tr>
</tbody>
</table>

See page 53 for How to Order specification
## Product Description

<table>
<thead>
<tr>
<th>Exit only</th>
<th>Dummy Trim</th>
<th>Night Latch</th>
<th>Night Latch</th>
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<tbody>
<tr>
<td>—</td>
<td>—</td>
<td>98NL-F</td>
<td>98NL-OP-F</td>
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<tr>
<td>—</td>
<td>—</td>
<td>990DT</td>
<td>990NL-R/V</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>3 x 14\frac{1}{4}&quot; x \frac{3}{8}&quot; (76 x 360 x 2 mm)</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>3 x 14\frac{3}{4}&quot; x \frac{3}{8}&quot; (76 x 360 x 2 mm)</td>
<td>—</td>
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<tr>
<td>—</td>
<td>—</td>
<td>5\frac{1}{2}&quot; (140 mm)</td>
<td>—</td>
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<tr>
<td>—</td>
<td>—</td>
<td>2&quot; (51 mm)</td>
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<tr>
<td>01</td>
<td>—</td>
<td>03</td>
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### Escutcheon Plate Size

<table>
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<th>Trim Description</th>
<th>Cylinder Type</th>
<th>Optional Trim (See pages 32 – 34)</th>
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<tbody>
<tr>
<td>—</td>
<td>—</td>
<td>x990E-0</td>
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### Pull Center to Center

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</tr>
<tr>
<td>5\frac{1}{2}&quot; (140 mm)</td>
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</tr>
<tr>
<td>2&quot; (51 mm)</td>
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### ANSI Function

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### Cylinder Type

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<tbody>
<tr>
<td>—</td>
<td>—</td>
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</tbody>
</table>

### For optional trims and functions see pages 32-34
SECTION 08 83 00
MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Safety (tempered) glass mirrors.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section

1.2 REFERENCES

A. AISI - American Iron and Steel Institute

B. ASTM - American Society for Testing and Materials

C. GANA - Glass Association of North America

D. NAMM - National Association of Mirror Manufacturers
   1. MIRRORS, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors.

1.3 SUBMITTALS

A. Samples: Submit samples, 12 inches square in size, of mirrored glass specified, including edge treatment on 2 adjoining edges of samples.

1.4 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of GANA “Glazing Manual” except where more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or referenced standards.

B. Mirror Manufacturers’ Document: Comply with recommendations of NAMM in its publication “MIRRORS, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors”.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions for shipping, storing, and handling mirrored glass; avoid deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with mirrored glass installation until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Binswanger Mirror Products; Texas Mirror, Inc.; Avalon Glass & Mirror Co.

2.2 GLASS FOR MIRROR PRODUCTION

A. Tempered Glass: Tempered float glass manufactured by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated, complying with ASTM C1048 for Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent, flat), Quality q3 (glazing select), and for class indicated below:

B. Glass Coating: Coat second surface of glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer’s standard protective organic coating to produce coating system that complies with FS DD-M-0041, except with salt-spray test period extended to 300 hours and undercutting, discolorations, blackening, and silver impairment at mirror edges not greater than 1/8-inch.
   1. Mirror Sizes: After application of glass coating, cut mirrored glass to final sizes with nominal glass thickness of 0.23-inch.

C. Mirror Edge Treatment
   1. Flat polished edge.
   2. Perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.3 MISCELLANEOUS MATERIALS

A. Custom Channel: Stainless steel, AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum thickness, unless otherwise indicated.

B. Setting Blocks: Neoprene, 70 - 90 Shore A hardness.
C. Edge Sealer: A coating that has proven to be compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirror edges.

D. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application, certified as compatible with glass coating by organic protective coating manufacturer and approved by mirror manufacturer.

E. Fasteners, Anchors, and Inserts: Provide devices as required for installation of mirror and frame.

PART 3 - EXECUTION

3.1 GLAZING

A. General: Install mirrors to comply with printed directions of mirror manufacturer. Mount mirrors in place to avoid distorting reflected images and provide space for air circulation between back of mirror and face of mounting surface.

B. Mastic Spot Installation System
   1. Identify and examine surfaces over which mirror is to be mounted. Comply with manufacturer’s printed installation directions for preparation of mounting surfaces including coating surfaces with mastic manufacturer’s special bond coating where applicable.
   2. Apply barrier coat to mirror backing where approved by manufacturers of mirror and backing material.
   3. Apply mastic in spots to comply with mastic manufacturer’s printed directions for coverage and to allow air circulation between back of mirror and face of mounting surface.
   4. After mastic is applied, align mirror and press into place while maintaining a minimum air space of 3/16-inch between back of mirror and mounting surface.
   5. Install permanent means of support at bottom and top edges with bottom support designed to withstand mirror weight and top support to prevent mirror from coming away from wall along top edges.
      a. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable.
      b. For continuous bottom supports, provide 1/8-inch by 4 inch setting blocks at quarter points. For channels or other continuous supports in which water could be trapped, provide two 1/4-inch diameter weeps drilled between setting blocks.
      c. Provide clips along top of mirror.

3.2 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirror to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirror from being exposed to moisture from condensation or other sources for continuous periods of time.
D. Wash mirrors not more than 4 days prior to date scheduled for inspections intended to establish date for Substantial Completion. Wash glass by methods recommended in NAMM document and by mirrored glass manufacturer. Use water or glass cleaners free from substances capable of damaging mirror edges or glass coating.

END OF SECTION
SECTION 09 24 00
CEMENT PLASTERING

PART 1 - GENERAL

1.1  SUMMARY

A. Section Includes: Patching and repair of existing portland cement plaster system as indicated.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
1. Section 09 90 00 - Painting and Coating: For finish painting.

1.2  REFERENCES

A. ASTM - American Society for Testing and Materials
1. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. in Thickness.
8. C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.


C. ML/SFA - Metal Lath/Steel Framing Association

1.3  SYSTEM DESCRIPTION

A. Performance Requirements
1. Provide exposed plaster finish surfaces that are true and even without waves, cracks, or other imperfections. Cracks, blisters, pits, or discoloration will not be acceptable.
2. Sheathing, lath, and related accessories shall provide proper, secure base and reinforcement for plaster systems. Unless specifically noted otherwise, conform to ML/SFA.

3. Exterior Vertical Wall System
   a. Wind Loading: Wall system shall withstand dead loads and live loads caused by pressure and suction of wind in accordance with CBC Section 2508.
   b. Maximum deflection of studs and composite wall system shall be L/360.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data completely describing products.

B. Samples: Minimum 12-inch by 12-inch sample panels for review of finish texture by the Architect. Should sample panel be rejected, continue to submit until satisfactory texture is achieved. Sample passing review shall serve as standard of quality for the Project.

PART 2 - PRODUCTS

2.1 LATH MATERIALS

A. Building Paper: Asphalt saturated organic felt, ASTM D226, Grade D, Style 2, 60 minute permeability rated, as manufactured by Fortifiber Building Systems Group, “Super Jumbo Tex, 60 Minute”; DuPont, “Tyvek”; HAL Industries Inc.

B. Lath
   1. Expanded Metal Lath: Comply with ASTM C847 for material, type, configuration, and other characteristics indicated below:
      a. Material: Fabricate expanded metal lath from sheet metal conforming to the following:
         1) Galvanized Steel: Structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A653, G60 minimum coating designation, unless otherwise indicated.
         1) Configuration: Self-furring.
         2) Weight: 2.5 lb/sq. yd.
      c. Rib Lath
         2) Weight: 3.4 lb/sq. yd.

C. Accessories: Provide ASTM C1063, galvanized steel accessories of the following:
   1. Corner and Strip Reinforcement: Expanded large-mesh diamond metal lath fabricated from welded wire mesh fabricated from 0.0475-inch diameter zinc-coated (galvanized) wire.
   2. Corners: Provide welded wire square corner assembly with 2-1/2 inch legs, as manufactured by ClarkDietrich Building Systems; CEMCO; McNichols Co.
   3. Casing Beads: Square-edged style, with expanded flanges and removable protective tape, of zinc-coated (galvanized) steel, as manufactured by ClarkDietrich Building Systems; CEMCO; McNichols Co.
4. Control Joints: Prefabricated, galvanized steel, minimum 0.0172-inch thick. Provide removable protective tape on plaster face of control joints.
   a. One-Piece Control Joint: Folded pair of nonperforated screeds in W-shaped configuration, with expanded or perforated flanges.

5. Foundation Sill (Weep) Screed: Manufacturer's standard profile, fabricated from zinc-coated (galvanized) steel sheet, as manufactured by ClarkDietrich Building Systems; CEMCO; McNichols Co.

D. Fasteners
   1. Steel Drill Screws: For metal-to-metal fastening, ASTM C1002 or ASTM C954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than 3 exposed threads.
   2. For Attaching Metal Lath to Substrates: Complying with ASTM C1063.
      a. Power actuated fasteners where allowed and as indicated on the Drawings; 3/4-inch long hardened drive pins with a 1/2-inch diameter galvanized disc or washer.
      b. Concrete screws where required for stucco accessories.
      c. Wood Substrates: Furring nails, ring shanked, corrosion resistant.
      d. Steel Studs: Steel drill screws, ASTM C954.

2.2 PLASTER MATERIALS

A. Portland Cement: ASTM C150, Type I.

B. Sand for Portland Cement Plaster: ASTM C897; graded in accordance with requirements.

C. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

D. Fiber Reinforcement: Fibers shall be 3/4-inch multifilament polypropylene fibers as supplied by Grace Construction Products, “Grace Microfibers”; Sto Corporation; Quikcrete.

E. Bonding Agent: As manufactured by Sto Corporation, “Sto Bonding Agent”; Omega Products International; Merlex Stucco.

2.3 MIXES

A. General: Comply with ASTM C926 for applications indicated.
   1. Fiber Content: Add fiber to base coat mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb. of fiber/cu. ft. of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

B. Portland Cement Base Coat Mixes: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.
1. Over Metal Lath: Scratch and brown coats for 3-coat plasterwork as follows:
   a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
   b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
2. Materials: As manufactured by Sto Corporation; Omega Products International; Merlex Stucco.

C. Finish: Match existing, as specified in Section 09 90 00.

PART 3 - EXECUTION

3.1 PREPARATION

A. Building Paper: Cover sheathing with building paper as follows:
   1. Apply 2 layers of building paper horizontally with 3 inch overlap and 6 inch endlap. Offset overlaps.
   2. Apply building paper to cover upstanding flashing with 4 inch overlap.
   3. Apply building paper over sheathing as soon as practical after sheathing installation to prevent deterioration or expansion from wetting.

3.2 CUTTING AND PATCHING (WHERE REQUIRED)

A. Carefully cut existing plaster to allow the installation of new Work.
   1. Score the existing surface with a diamond blade and carefully chisel existing cement plaster away from existing metal lath.
   2. Under-cut existing plaster edge to create a dovetail connection with the repair plaster.
   3. Protect existing metal lath and paper backing to the greatest extent possible.
   4. Protect keys of surround plaster.

B. Slide new paper backing under existing metal lath and paper backing as far as possible, but not less than that required to provide a 4-inch lap.
   1. Lap existing lath and new paper over flashing/reglet/accessory installation as shown or indicated on the Drawings.

C. Patch and repair plaster as necessary to accommodate the other Work and to match existing adjacent finishes to the greatest extent possible.

3.3 INSTALLATION OF PLASTERING ACCESSORIES

A. Accessories for Portland Cement Plaster
   1. External Corners: Install corner aid at external corners.
   2. Casing Beads: Install at terminations of plaster work unless otherwise indicated.
   3. Reinforcing Mesh: Before applying finish coat install reinforcing mesh. Place 4 inch by 12 inch butterflies diagonally at corners of rectangular openings. Place minimum 4 inch wide collars around all penetrations. Horizontal or vertical laps shall be a minimum of 1 inch.
4. Control Joints: Install control joints at locations indicated on Drawings.
5. Expansion Joints: Install expansion joints at locations indicated on Drawings.

B. Install metal lath to comply with referenced standards and ASTM C1063 for installation of lathing and furring for portland cement plaster. Attach lath using corrosion-resistant fasteners.

3.4 PLASTER APPLICATION

A. Portland Cement Application Standard: Apply portland cement plaster materials, compositions, and mixes to comply with ASTM C926, including recommendations for time between coats and curing in “Annex A2 Design Considerations”.

1. Sequence plaster application with the installation and protection of other work so that neither will be damaged by the installation of the other.
2. Do not use materials that are frozen, caked, lumpy, dirty or contaminated by foreign materials.
3. Do not use excessive water in the mixing and application of plaster materials.
4. Corners: Make internal corners and angles square; finish external corners square and true with plaster faces on exterior work.
5. Apply scratch coat to a 3/8-inch thickness and score lightly in a horizontal direction only, keeping surface moist for 48 hours using a fine fog spray of water.
6. Apply brown coat to 3/8-inch thickness over scratch coat. Brown coat shall be floated to provide even, level surface, with no variation greater than 1/4-inch in 8 feet-0 inches. Do not rod brown coat.
   a. Cure brown coat with a very fine fog spray of water after brown coat has achieved initial film formation, not sooner than 30 minutes, to prevent checking.
   b. Cure for 2 weeks prior to application of first finish coat.
   c. Finish Coat: Match existing.

B. Tolerances: Do not deviate more than 1/8-inch in 10 feet-0 inches from a true plane in finished plaster surfaces, as measured by a 10 feet-0 inches straightedge placed at any location on surface.

C. Clean and prepare area to receive repair plaster in accordance with manufacturer’s recommendations.

D. Bonding Compound: Apply at butt joint between existing and repair plaster where required.

3.5 REPAIRS

A. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace the work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar imperfections. Repair or replace the work as necessary to comply with required visual effects.
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Gypsum board screw attached to metal and wood framing and furring members, joint treatment, and accessories.
   2. Installation of sound deadening insulation in walls and ceilings and including acoustical sealant, tape, and the like for work of this Section.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 07 21 01 - Building Insulation: Provision of building insulation.
   2. Section 07 92 00 - Joint Sealants: Provision of caulking and sealants and backer rod.
   3. Section 09 30 00 - Tiling: Provision of ceramic tile.
   4. Section 09 90 00 - Painting and Coating: For finish painting.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials
   4. C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.


C. CFR - Code of Federal Regulations

D. EPA - Environmental Protection Agency
E. GA - Gypsum Association
1. 201 - Using Gypsum Board for Walls and Ceilings.
2. 214 - Recommended Levels of Gypsum Board Finish.
4. 253 - Application of Gypsum Sheathing.

F. UL - Underwriters Laboratories Inc.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product data. Include the following:
1. Fire Resistance Data: Include required fire test results for gypsum board systems on partitions and ceilings.
2. Sound Transmission Data: Include certified evidence that installed gypsum board systems and materials meet required STC levels.

1.4 QUALITY ASSURANCE

A. Fire Test Response Characteristics: Where fire resistance rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
1. Fire Resistance Ratings: As indicated by GA File Numbers in GA 600 or design designations in UL FRD or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site: Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier. Verify board and accessories as undamaged.

B. Storage and Protection
1. Store materials inside under cover and keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
2. Handle gypsum boards to prevent damage to edges, ends and surfaces.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Establish and maintain environmental conditions for application and finish gypsum board to comply with ASTM C840 and with gypsum board manufacturer’s recommendations. Maintain not less than 40 degrees Fahrenheit minimum room temperature.
1. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during day, hot weather to prevent materials from drying too rapidly.
PART 2 - PRODUCTS

2.1 MANUFACTURERS


2.2 MATERIALS

A. Gypsum Board Types
   1. Type 1: Fire rated board for fire resistance rated assemblies, ASTM C1396, Type X, tapered edges, 48 inches wide, 5/8-inch thick.
   2. Type 2: Fire rated water resistant board, Type X, tapered edges, 48 inches wide, 5/8-inch thick.

B. Sheathing: Silicone treated gypsum core, surfaced with inorganic glass mats and gold color alkali resistant surface coating, 5/8-inch thick, as manufactured by Georgia Pacific, “DensGlass Fireguard Sheathing”; United States Gypsum Co., “SECUROCK Glass Mat Sheathing; Pacific Coast Building Products, Pabco Gypsum Division.

C. Screws: ASTM C1002, machine thread for gypsum board to metal attachments.

D. Nails: ASTM C514, wood thread for metal or gypsum board attachment to wood.

E. Insulation: As specified in Section 07 21 01.

F. Adhesives: Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Accessories

H. Joint Treatment Materials: Products of one manufacturer conforming to ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for application indicated. Conform to GA 201 and GA 216 for reinforcing tape, joint compound, and water.
   1. Joint Tape
      a. Cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape as recommended by setting type joint compound manufacturer.
      b. For silicone treated gypsum backer board, use 2 inch wide, 10-inch by 10-inch woven glass mesh tape.
2. Setting Type Joint Compound: Factory prepackaged, job mixed, chemical hardening powder products formulated for uses indicated or factory premixed product. Use hot type at exterior gypsum soffits.

I. Acoustical Sealant: As specified in Section 07 92 00.

J. Backer Rod: As specified in Section 07 92 00.

2.3 FINISHES

A. Levels of Gypsum Board Finish as Defined by GA 214. Levels of finish as indicated on the Finish Schedule.

1. Level 0: No taping, finishing, or accessories required.
2. Level 1: All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
3. Level 2: All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
4. Level 3: All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes.
5. Level 4 - Typical: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes.
6. Level 5: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer’s recommendations, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of finish paint.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Gypsum Board
1. Install and finish gypsum board to comply with ASTM C840 or GA 216.
   a. Single Layer: Install in accordance with ASTM C840, except as amended or required by specific fire resistive or sound isolation system detailed. In that instance, application shall conform to requirements of the manufacturer’s tests as reviewed and accepted in the submittal.
   b. Double Layer: Conform to applicable portions of ASTM C840, System Classification VIII for installations applied with screws. Conform to required fire resistance standards.
2. Apply in horizontal direction with ends and edges falling on supports. Gypsum board shall be of maximum length possible to reach full wall or ceiling lengths with minimal number of joints.
3. Position boards so that like edges abut, tapered edges against tapered edges and field cut ends against field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
4. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.

B. Fire Resistant Assemblies: Wherever fire rated gypsum board construction is indicated, provide materials and installation methods, including types and spacing of fasteners, in accordance with CBC, GA Manual, or listed assembly indicated. Apply firestopping at top of wall and at penetrations through fire resistant assembly.

C. Gypsum Sheathing
1. Comply with GA 253 and manufacturer’s written instructions.
2. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
3. Install boards with a 3/8-inch setback where non-load-bearing construction abuts structural elements.
4. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
5. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
6. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
7. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.
   a. Space fasteners approximately 8 inches on center and set back a minimum of 3/8-inch from edges and ends of boards.
8. **Vertical Installation:** Install board vertical edges centered over flanges of steel studs. Abut ends and edges of each board with those of adjacent boards. Screw-attach boards at perimeter and within field of board to each steel stud.  
   a. Space fasteners approximately 8 inches on center and set back a minimum of 3/8-inch from edges and ends of boards.

   **D. Penetrations Through Sound-Rated Construction:** Existing sound-rated construction is present, and modifications shall be made in a manner that preserves sound rating. Cut-outs shall be regular and not fracture core or tear covering of gypsum board and meet the following requirements:
   1. Minimize penetrations of insulated wall and ceiling constructions. Penetrate only where necessary and fully seal airtight at the perimeter using acoustical sealant.
   2. Where ducts and piping greater than 3 inches diameter penetrate insulated wall or ceiling construction, provide a clearance of 1 inch plus or minus 1/4-inch at the perimeter of the penetration.
   3. Where conduit piping 3 inches diameter and less (including mechanical, hydraulic, plumbing, etc.) pass through insulated wall or ceiling construction, provide a clearance of 1/4-inch plus or minus 1/8-inch between the conduit or piping and the structure, unless otherwise indicated.
   4. After the ductwork, conduit, or piping has been installed, repair the gypsum board perimeter clearance to the specified tolerance as required. Where the clearance exceeds 3/4-inch, provide a sheet metal sleeve within the partition packed with safing insulation batts and caulk both sides airtight with an acoustical sealant. Where the perimeter clearance exceeds 3/8-inch, use a flexible backing rod to caulk against.
   5. Where penetration clearances are 3/8-inch or less, caulk airtight with acoustical sealant at gypsum board.
   6. All gypsum board penetrations (including those resulting from wiring, cables, and electrical junction boxes) are to be sealed airtight with acoustical sealant.
   7. The back and sides of junction boxes in sound rated construction shall be sealed airtight with sheet caulking. Caulk perimeter face at gypsum board with acoustical sealant.
   8. Recessed panel boards, equipment, boxes, etc., with penetration area greater than 25 square inches at sound rated partitions shall be fully enclosed and sealed with 5/8-inch thick gypsum board.
   9. Seal multiple conduit penetrations airtight with expanding fire foam sealant.
   10. Seal other sound rated conditions with spray-applied (40 pcf) cementitious sealant, as manufactured by Grace Construction Products, “Monokote Z-146”; Rust-Oleum; Uline.

   **E. Wet Locations at Restrooms**
   1. At Walls and Ceilings: Conform to ASTM C840, System Classification X.
   2. Treat cut edges and holes in water resistant gypsum board with sealant.

   **F. Fastenings:** Attach gypsum board to framing with screws, lengths and sizes as recommended by manufacturer and in accordance with CBC.
G. Accessories
1. Install square corner beads at vertical and horizontal external corners with fasteners.
2. Install casing beads whenever edge of gypsum board would otherwise be exposed or semi-exposed, or where abutting dissimilar materials.
3. Install expansion joints where indicated on the Drawings.
4. After accessories are installed, correct surface damage and defects.
5. Install trims and expansion joints where required.
6. Resilient Channel Attachment: Screw attach resilient channel through foot on 1 side of channel only to wood joists. Screw attach gypsum board through channel face only. At resilient channel assemblies, screw attached gypsum board shall not be in contact with joists, studs, or any rigid fastening.

H. Allowable Tolerances
1. Offset Between Planes of Board Faces: 1/16-inch.
2. Plane, Level, Warp and Bow: 1/8-inch in 8 feet.
3. Shim panels as necessary to comply with tolerances.

3.2 FINISHING OF GYPSUM BOARD

A. Apply joint treatment at gypsum board joints; flanges of corner bead, edge trim and penetrations, fastener heads and surface defects in accordance with ASTM C840 or GA 216. Number of coats of treatment shall be as specified above.

B. Finish Painting: As specified in Section 09 90 00.

END OF SECTION
SECTION 09 30 00
TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Interior ceramic floor and wall tile.
   2. Setting beds, flashing, grouts, and accessories as required for complete tile installation.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
   1. Section 09 29 00 - Gypsum Board: Provision of glass-mat, water-resistant gypsum backing board.

1.2 REFERENCES

A. ANSI - American National Standards Institute
   1. A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   5. A108.17 - Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone.
   6. A118.4 - Latex-Portland Cement Mortar.
   7. A118.6 - Standard Cement Grouts for Tile Installation.
   8. A118.10 - Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
   9. A118.12 - Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
   10. A137.1 - Ceramic Tile.

B. ASTM - American Society for Testing and Materials

C. TCNA - Tile Council of North America

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each type of product specified.
B. Samples: Submit samples for initial selection purposes in form of manufacturer’s color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.

1.4 MAINTENANCE

A. Extra Materials: Deliver extra materials to the College’s Representative. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

B. Tile and Trim Units: Furnish quantity of full size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers
   1. Ceramic Tile: Daltile, “Natural Hues on Eco-Body”; Butler-Johnson Ceramics; Crossville Ceramics Co., L.P.

2.2 MATERIALS

A. Tile Materials: Comply with ANSI A137.1.
   1. Colors, Textures, and Patterns: As selected by the Architect from manufacturer’s full range of standard colors, textures, and patterns for products of type indicated, with minimum 0.6 percent coefficient of friction.
   2. Tile Grade: Standard Grade, unless otherwise indicated.
   3. Unglazed Ceramic Floor Tile and Glazed Ceramic Wall Tile
      a. Size: Nominal 3 inches by 6 inches.
      b. Face: Plain with modified square edge or cushion edge.
      c. Trim: Provide base, cap, and corner profiles to match existing.
      d. Note: Match existing colors, layout, and bond pattern as closely as possible.

B. Floor Leveling Primer: As recommended by the manufacturer of the self-leveling underlayment.

C. Self-Leveling Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in uniform thicknesses from 1/8-inch up to 2 inches and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
   2. Compressive Strength: Not less than 4,100 psi at 28 days when tested according to ASTM C109.
D. Crack Isolation Membrane: Complies with ANSI A118.12, as manufactured by MAPEI Corporation, “Mapecguard™ 2”; Laticrete International, Inc., “Hydro Ban®; TEC, “HydraFlex™ Waterproofing Crack Isolation Membrane”.

E. Wall Tile Backer Board: As specified in Section 09 29 00.

F. Waterproof Membrane: 15 pound roofing felt or 4-mil polyethylene film; complies with ANSI A118.10.

G. Setting Bed and Grouting Materials
   2. Standard Sanded Cement Grout: ANSI A118.6, color as indicated.
   3. Water: Potable, free from impurities detrimental to tile work.
   4. Grout Cleaner: As recommended by the tile manufacturer.
   5. Sealer: As recommended by the tile manufacturer.

2.3 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove existing floor tile and adhesive materials where indicated to provide a clean, structurally sound concrete slab free of contaminants.

B. Apply floor leveling primer as recommended by the self-leveling underlayment manufacturer.

C. Apply self-leveling underlayment in accordance with manufacturer’s written instructions. Apply from 0 inches to 2 inches to bring floor substrate to the required plane.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under “American National Standard Specifications for the Installation of Ceramic Tile” that apply to type of setting and grouting materials and methods indicated.

C. **Tile Blending:** For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. **Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown.** Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

E. **Accurately form intersections and returns.** Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

F. **Jointing Pattern:** Lay tile in pattern as indicated on the Drawings. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
   1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

G. **Expansion Joints:** Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
   1. Locate joints in tile surfaces directly above joints in concrete substrates.

H. **Grout tiles to comply with the following requirements:**
   1. For ceramic tile grouts and latex portland cement grouts, comply with ANSI A108.10.
   2. Grout spacing width between tiles shall not exceed 1/4-inch.
   3. Seal grout joints at time of completion.

### 3.3 FLOOR TILE INSTALLATION

A. **Installation of Ceramic Tile Over Bond Coat Over Crack Isolation Membrane Over Cementitious Self-Leveling Underlayment Over Primer Over Concrete:** Install tile to comply with TCNA installation method F205.
   1. **Installation of Tile:** ANSI A108.5.
   2. **Installation of Cementitious Grout:** ANSI A108.10.
   3. **Installation of Crack Isolation Membrane:** ANSI A108.17.

### 3.4 WALL INSTALLATION

A. **Installation of Ceramic Tile Over Cementitious Bond Coat Over Optional Waterproof Membrane Over Coated Glass Mat Water-Resistant Gypsum Backer Board Over Wood or Metal Studs:** Install tile to comply with TCNA installation method W245.
   1. **Installation of Tile:** ANSI A108.5 or A108.6.
   2. **Installation of Cementitious Grout:** ANSI A108.10.
   3. **Installation of Waterproof Membrane:** ANSI A108.13.
B. Note: Adjust setting method and setting bed depth as required to match flush with existing.

3.5 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove latex portland cement grout residue from tile as soon as possible.
   2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer’s printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
      a. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
   3. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
   4. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.
      a. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
      b. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
   5. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION
SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Suspended acoustical ceiling system.
2. Acoustic ceiling panels where required to match existing.
3. Installation of compression struts at existing ceilings.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
1. Section 06 20 00 - Finish Carpentry: Provision of wood slat ceiling assembly.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials
2. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. E1264 - Classification for Acoustical Ceiling Products.


C. DSA - The Division of the State Architect
1. IR 25-2.13 - Metal Suspension Systems for Lay-In Panel Ceilings.

D. UL - Underwriters Laboratories Inc.

1.3 SYSTEM DESCRIPTION

A. Design Requirements
1. Ceilings shall comply with requirements for seismic bracing and ceiling suspension according to CBC and ASTM E580.
2. Architectural reflected ceiling plan drawings shall govern over Mechanical and Electrical Drawings.
1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data completely describing products.

B. Shop Drawings: Show complete ceiling layouts, seismic bracing methods and details of installation, and information required for related work.

C. Samples: Provide 1 panel of each type of acoustical ceiling specified.

D. Compression Struts Installation Plan: Prior to commencing work, provide the Architect with details of actual conditions and the proposed plan for installation of compression struts at existing ceilings where indicated.

E. Quality Control Submittals: Submit manufacturer’s installation instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is approved by the acoustical ceiling manufacturer for installing the type of acoustical ceiling indicated for this Project.

B. Regulatory Requirements: Install fire rated ceiling systems in accordance with CBC and UL FRD listing and requirements of agency having jurisdiction.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Deliver and store packaged products in original containers with seals unbroken and labels intact until time of use.

B. Storage and Protection
   1. Keep materials dry by storing off ground; under watertight covers.
   2. Immediately before installation, panels shall be stored for sufficient time to stabilize temperature and humidity conditions ambient during installation and anticipated for occupancy.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Do not begin work until residual moisture has dissipated and comply with the following:
   1. Acoustical Ceilings: Maintain uniform temperature of minimum 60 degrees Fahrenheit and maximum of 90 degrees Fahrenheit and humidity of 20 to 40 percent but no more than 90 percent prior to, during and after installation.

1.8 SEQUENCING AND SCHEDULING

A. Schedule installation of acoustic units after interior wet work is dry.

B. Coordinate installation of ceilings with mechanical and electrical work.
1.9 MAINTENANCE

A. Extra Materials: Provide 5 percent extra quantity of each type of acoustical surface installed. Provide in original unbroken containers plainly marked with type and quantity of contents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Suspended Ceiling System

1. Panels: Moisture resistant wet formed mineral fiber with factory applied vinyl latex paint, mildew resistant, recycled content, and with the following properties:
   a. Size: 24 inches by 24 inches.
   b. Light Reflectance: Minimum LR 0.90 in accordance with ASTM E1264.
   c. NRC Range: 0.70.
   d. Edge: Beveled tegular.
   e. Surface Burning Characteristics: Class A in accordance with ASTM E84, with flame spread 25 or under.

2. Mechanical Suspension System: Heavy-duty, non-fire rated, exposed grid system for ceiling panels, double-web tees, steel body with exposed surfaces factory painted with baked polyester paint; complies with ASTM C635.
   a. Provide panel centering devices built into each grid member.
   b. Pull out tension values greater than 300 pounds.
   d. Product: As manufactured by Armstrong World Industries, “Prelude XL 15/16-Inch Exposed Tee System”; USG Interiors, Inc.; BPB USA.

3. Main runners, cross runners, splices, expansion devices, and intersection connectors shall be designed to carry a mean ultimate test load of not less than 180 pounds in compression and tension in accordance with ASTM E580, Section 5.1.2.

B. Replacement Acoustic Panels Where Indicated: Match existing adjacent panels.

C. Compression Struts: Based on weight of ceiling, comply with DSA IR 25-2.13 as applicable for ceiling bracing.

D. Fasteners and Attachments

1. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, 12 gauge, minimum tensile strength 70 ksi; maximum allowable (ASD) tension load for wire meeting this specification is 350 pounds.

2. Angle-Type Hangers: Angles with legs not less than 7/8-inch wide, formed from 0.0635-inch thick galvanized steel sheet complying with ASTM A653, G90 Coating Designation, with bolted connections and 5/16-inch diameter bolts.

3. Ceiling Clips: Minimum 13 gauge by 3/4-inch wide, as recommended by acoustical ceiling manufacturer.
4. Light Fixture Protection and Hold Down Clips: Provide light fixture protection panels, fasteners and hold down clips as required by UL FRD listing, manufacturer’s standard types.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive acoustical treatment and verify that:
   1. Installation of building components located in ceiling plenum is complete.
   2. Spacing, direction and details of grid members and supports to accommodate installation of light fixtures, diffusers and other ceiling located items are correct.
   3. Areas are clean and free of materials or rubble that could damage acoustical surfaces.

B. Do not start work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Suspended Ceiling System
   1. Install acoustical material and suspension system, including necessary hangers and other supporting hardware in accordance with manufacturer’s instructions, ASTM C636, and Section 5.2 of ASTM E580.
   2. Lay work out symmetrically about centers of rooms and provide symmetrical borders not less than half size of tile specified unless noted otherwise on the Drawings.
   3. Make penetrations through ceiling panels in such a manner to ensure tight fit and neat appearance. Center penetrations in tile unless otherwise noted.
   4. Where existing systems are to be repaired, make replacement components longest lengths possible. Mechanically attach new components to existing equivalent to splice requirements for new suspension system. Install flush, flat, and aligned with existing suspension members.

B. Suspension System
   1. Install in accordance with CBC and DSA.
   2. For Hanger and Lateral Bracing Wires: Install expansion bolts or ceiling clips as required.
   3. Hanger Wires
      a. Insert hanger wires around expansion bolts or through ceiling clips in accordance with Code and secure as specified for hanger wires following in this Article. Load test hanger wires as specified in Article titled “Field Quality Control” in this Section.
      b. Plumb hanger wires. Add counterbrace wires when hanger wires are more than 1 in 6 out of plumb.
   4. Provide additional metal framing and hanger wires to clear furred-area interferences with suspension system. Do not penetrate ductwork with hanger wires.
   5. Ceiling wires and unbraced ducts, pipes and similar type items shall be separated by at least 6 inches.
   6. Provide hanger wires at intersection of grid members.
7. Provide hanger wire supports for all recessed light fixtures and mechanical items as required for total support independent of acoustical ceiling systems.
8. Use of scrap or short-cut members is not permitted.
9. Connect grid members with positive interlocking method as standard with reviewed manufacturer.
10. Secure ends of suspension system members at 2 adjacent walls as indicated and leave floating at other 2 adjacent walls.
11. Interconnect carriers over 12 inches not interconnected to walls near free end with 16 gauge tie wire or a metal strut securely attached to prevent spreading.
12. Level grid assembly in each area after installation of mechanical and electrical equipment within 1/8 inch in 12 inches or conforming to slope as appropriate to area of installation.

C. Repair of Existing Acoustical Ceilings: Where existing suspension systems are indicated to remain, replace acoustic panels that are damaged or stained to match existing adjacent panels.

3.3 FIELD QUALITY CONTROL


3.4 CLEANING AND ADJUSTING

A. Remove damaged or soiled material and replace with new prior to the College’s acceptance of Project.

3.5 PROTECTION

A. Protect acoustical treatment installation from damage during remainder of construction.

END OF SECTION
SECTION 09 65 00
RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Repair of existing vinyl composition tile (VCT).
   2. Repair of existing rubber wall base.
   3. Rubber stair nosing where indicated.
   4. Drop-over cable protector where indicated.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act

B. ASTM - American Society for Testing and Materials
   2. F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each type of product specified.

B. Samples: Submit samples for initial selection purposes consisting of actual sections of vinyl composition tile, wall base, and resilient nosing showing full range of colors and patterns available for each different product indicated.

1.4 MAINTENANCE

A. Extra Materials
   1. Furnish 5 linear feet in roll form of each different composition, wearing surface, color, and pattern of resilient wall base and stair nosing installed.
   2. Furnish 1 box of each class, wearing surface, color, pattern, and size of resilient floor tile installed.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers

2.2 MATERIALS

A. Vinyl Composition Tile: Products complying with ASTM F1066, Composition 1 (nonasbestos formulated).
   1. Class: Class 2.
   2. Wearing Surface: Smooth.
   4. Pattern: Match existing.
   5. Color: Match existing.

B. Rubber Wall Base: Products complying with ASTM F1861.
   1. Style: Match existing.
   3. Height: Match existing.
   4. Lengths: Coils in lengths standard with manufacturer but not less than 100 feet.
   5. Interior and Exterior Corners and Ends: Field-formed.

C. Resilient Stair Nosing
   1. Material: Rubber.
   2. Style: Contrasting insert for visually impaired; accepts 1/4-inch with lip, 3/8-inch without lip.
   3. Height: 2 inches.
   4. Thickness: 1/4-inch.
   5. Size: Lengths and depths to fit each stair tread in 1 piece.
   6. Color: As selected by the Architect.

D. Drop-Over Cable Protector: Black heavy-duty rubber with a skid-resistant high traction surface designed for light industrial applications; 3-channel modular design with interlocking T-connectors to allow multiple cable ramps to be connected together to suit required length.
   1. Length: Approximately 40 inches per module.
   2. Width: Approximately 14 inches.
   3. Height: Approximately 1.875 inches.
2.3 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

B. Patching Compounds: Latex modified, portland cement based formulation provided or approved by resilient flooring manufacturer for applications indicated.

C. Stair-Tread-Nose Filler: As recommended by the stair nosing manufacturer.

D. Adhesives: Waterproof, nonflammable, type as recommended by resilient flooring manufacturer.
   1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D5116:
      a. Total VOCs: 50 g/L.
      b. Formaldehyde: 0.05 mg/sq. m x h.
      c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

E. Transition Strips: Match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting resilient flooring performance. Verify that substrates and conditions are satisfactory for resilient flooring installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the resilient flooring manufacturer.
   2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

3.2 PREPARATION

A. General: Comply with manufacturer’s installation specifications to prepare substrates indicated to receive resilient flooring accessories.

B. Use patching compounds per manufacturer’s directions.

3.3 INSTALLATION

A. General: Comply with manufacturers’ installation directions and other requirements indicated that are applicable to each type of installation included in Project.
B. Resilient Tile Installation
   1. Lay out 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 at perimeter that equal less than one-half
      of a tile. Install tiles square with room axis, unless otherwise indicated.
   2. Match tiles for color and pattern by selecting tiles from cartons in same
      sequence as manufactured and packaged, if so numbered. Cut tiles neatly
      around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
      a. Lay tiles in pattern to match existing.
   3. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures,
      built-in furniture including, pipes, outlets, edgings, thresholds and nosings.
      Extend tiles into toe spaces, door reveals, closets, and similar openings.
   4. Maintain reference markers, holes, or openings that are in place or plainly
      marked for future cutting by repeating on finish flooring as marked on
      subfloor. Use chalk or other nonpermanent marking device.
   5. Adhere tiles to flooring substrates without producing open cracks, voids,
      raising and puckering at joints, telegraphing of adhesive spreader marks, or
      other surface imperfections in completed tile installation.
   6. Use full spread of adhesive applied to substrate in compliance with tile
      manufacturer's directions including those for trowel notching, adhesive
      mixing, and adhesive open and working times.
   7. Hand roll tiles where required by tile manufacturer.

C. Resilient Wall Base Installation
   1. Apply resilient wall base to walls, casework and other permanent fixtures in
      rooms and areas where base is required. Install wall base in lengths as long
      as practicable. Tightly adhere wall base to substrate throughout length of
      each piece, with base in continuous contact with horizontal and vertical
      substrates.
   2. Place resilient accessories so they are butted to adjacent materials of type
      indicated and bond to substrates with adhesive. Install reducer strips at
      edges of flooring that otherwise would be exposed.

D. Stair Accessories Installation
   1. Install in accordance with manufacturer’s written instructions.
   2. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread
      contours.
   3. Tightly adhere accessories to substrates throughout length of each piece.

E. Drop-Over Cable Protector: Field cut to provide sloped transition as indicated.
   Anchor securely to substrate in accordance with manufacturer’s written instructions.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing installation:
   1. Remove visible adhesive and other surface blemishes using cleaner
      recommended by manufacturers.
   2. Sweep or vacuum floor thoroughly.
   3. Do not wash floor until after time period recommended by manufacturer.
   4. Damp-mop resilient flooring to remove black marks and soil.
B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by flooring manufacturer.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes: Replacement of carpet to match existing where indicated.
B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES
A. ADA - Americans with Disabilities Act
B. ASTM - American Society for Testing and Materials

1.3 SUBMITTALS
A. Product Data: Submit manufacturer's product data for each type of carpet material and installation accessory required. Submit written data on physical characteristics, durability, resistance to fading, and flame resistance characteristics.
B. Samples
  1. Submit three 8 inch square samples of each carpet type illustrating color, weave, texture, and pattern.
  2. Submit manufacturer’s full range of color selections for carpet edge strips.

1.4 QUALITY ASSURANCE
A. Regulatory Requirements
  1. Fire-Test-Response Characteristics: Provide products with a critical radiant flux classification not less than 0.45 W/sq. cm., as determined by testing identical products per ASTM E648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  2. Striping for Visually Impaired: Conform to ADA requirements for strip of clearly contrasting color at least 2 inches wide placed parallel to and not more than 1 inch from nose of upper approach and lower tread of each stair.
  3. Carpet pile height shall be maximum 1/2-inch in accordance with ADA.

1.5 PROJECT CONDITIONS
A. Substrate Conditions: No condensation within 48 hours on underside of 4 feet by 4 feet polyethylene sheet, fully taped at perimeter to substrate.
B. Substrate Conditions: pH of 9 or less when substrate wetted with potable water and pHydron paper applied.

1.6 Warranty

A. Unless otherwise noted, manufacturer’s 10-year written warranty shall be submitted to the College against product failure covering both labor and material in the following areas:
   1. Edge ravel.
   2. Secondary back adhesion.
   3. Average 20 pounds tuft bind.
   4. No more than 10 percent face yarn loss.
   5. Static control protection.

1.7 Maintenance

A. Extra Materials
   1. Deliver extra materials to the College. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels describing contents.
   2. Carpet: Before installation begins, furnish quantity of full width for each type of material equal to 5 percent of amount installed.

Part 2 - Products

2.1 Manufacturers

A. Acceptable Manufacturers: Shaw Contract Group; Mohawk Carpets; Masland Group.

2.2 Materials

A. Carpet: Match existing.

B. Surface Filler: Water-resistant latex base type.

C. Cement: Waterproof type as recommended by carpet manufacturer.

D. Seaming Tape: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

E. Adhesives: Waterproof, nonflammable, carpet latex release adhesive system, type as recommended by carpet manufacturer, designed to facilitate easy removal of carpet at later date as furnished by carpet manufacturer.
   1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D5116:
      a. Total VOCs: 10.00 mg/sq. m x h.
      b. Formaldehyde: 0.05 mg/sq. m x h.
      c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

F. Transition Strip: Match existing where required.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

3.2 INSTALLATION

A. Comply with manufacturer’s recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position; do not place seams perpendicular to door frame, in direction of traffic through doorway.

B. Extend carpet under removable flanges and furnishings and into alcoves and closets of each space.

C. Provide cutouts where required, and bind cut edges where not concealed by protective edge guards or overlapping flanges.

D. Install carpet edge guard where edge of carpet is exposed; anchor guards to substrate.

E. Install with pattern parallel to walls and borders.

F. Install carpet by trimming edges, butting cuts with seaming cement, and taping and/or sewing seams to provide sufficient strength for stretching and continued stresses during life of carpet.

3.3 CLEANING

A. Remove adhesive from carpet surface with manufacturer’s recommended cleaning agent.

B. Vacuum carpet.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation, painting and finishing of new and existing exposed exterior and interior items and surfaces.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 05 50 00 - Metal Fabrications: For finish painting of miscellaneous metals.
   2. Section 06 20 00 - Finish Carpentry: For finish painting of finish carpentry.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim: For finish painting of sheet metal flashing and trim.
   4. Section 08 11 10 - Steel Frames: For finish painting of steel frames.
   5. Section 08 14 16 - Flush Wood Doors: For finish painting of wood doors.
   7. Section 09 24 00 - Cement Plastering: For finish painting of exterior cement plaster.
   8. Section 09 29 00 - Gypsum Board: For finish painting of gypsum board.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials

B. CALGreen - California Green Building Standards, 2013 Edition

C. CARB - California Air Resources Board

D. FM - Factory Mutual

E. UL - Underwriters Laboratories Inc.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. Paint exposed surfaces whether or not colors are designated in the schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural.
   2. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts and labels.
3. Do not paint over UL, FM, or other code required labels or equipment name, identification, performance rating or nomenclature plates.
4. Comply with CARB requirements for maximum volatile organic compound (VOC) content.

B. Paints and coatings used on the Project shall comply with CALGreen Code Nonresidential Mandatory Measures, Chapter 5, Division 5.5, Section 5.504, Articles 5.504.4.3, 5.504.4.3.1 and 5.504.4.3.2.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s technical product data information, stating the material composition and analysis and the Material Safety Data Sheet (MSDS) on all paint to be used.

B. Samples
   1. Following the selection of colors and glosses by the Architect, submit samples for the Architect’s review.
      a. Provide 3 samples of each color and each gloss for each material on which the finish is specified to be applied.
      b. Make samples approximately 8 inches by 10 inches in size.
   2. Do not commence finish painting until samples are approved.

1.5 QUALITY ASSURANCE

A. Provide primers and undercoat paint produced by the same manufacturer as finish coats.
   1. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrates.
   2. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
   3. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.6 MAINTENANCE

A. Upon completion of the work of this Section, deliver to the College an extra stock equaling 1 gallon of each color, type and gloss of paint used in the Work; tightly sealing each container, and clearly labeling with contents and location where used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Basis of Design is Dunn Edwards; Sherwin Williams and Kelly-Moore Paints are acceptable.
2.2 PAINT MATERIALS

A. Paint Materials, General
1. Material Quality: Provide manufacturer’s best quality trade sale paint material of the various coating types specified.
2. Provide block fillers, primers, finish coat materials and related materials that are compatible with one another and the substrates.

B. Colors
1. Exterior: Match existing.
2. Interior: Match existing.

C. Pigment
1. Pigment: To be no less than 24 percent and titanium dioxide to be no less than 20 percent of pigment by weight.
2. Vehicle: To be no less than 72 percent and vinyl resin to be no less than 26 percent of vehicle by weight.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Mix and prepare paint materials in strict accordance with the manufacturers’ recommendations as approved by the Architect.

B. Surface Preparation
1. General
   a. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers’ recommendations as approved by the Architect.
   b. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface applied protection prior to surface preparation and painting operations.
   c. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
2. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

C. Cementitious Materials: Prepare concrete and concrete masonry unit or board surfaces to be painted. 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.
   1. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
   2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer’s written instructions.
   3. At concrete floors, ensure substrate is fully cured, clean, and etched for best adhesion in accordance with paint manufacturer’s recommendations.
D. Preparation of Wood Surfaces
1. Clean wood surfaces until free from dirt, oil, and other foreign substance.
2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.
3. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12 percent or less as measured by a moisture meter approved by the Architect.

E. Preparation of Metal Surfaces
1. Thoroughly clean surfaces until free from dirt, oil and grease.
2. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with the phosphoric acid etch. Remove etching solution completely before proceeding.
3. Allow to dry thoroughly before application of paint.

3.2 PAINT APPLICATION

A. General
1. Touch-up shop-applied prime coats which have been damaged, and touch-up bare areas prior to start of finish coats application.
2. Slightly vary the color of succeeding coats.
3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of 5 feet.
4. On removable panels and hinged panels, paint the back sides to match the exposed sides.

B. Drying: Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suite adverse weather conditions.

C. Brush Applications
1. Brush out and work the brush coats onto the surface in an even film.
2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.

D. Spray Application
1. Confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
3. Do not double back with spray equipment to build up film thickness of 2 coats in 1 pass.

E. Miscellaneous Surfaces and Procedures
1. Exposed Mechanical Items
   a. Finish electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
   b. Paint visible duct surfaces behind vents, registers, and grilles flat black.
   c. Wash metal with solvent, prime and apply 2 coats of alkyd enamel.
2. Exposed Pipe and Duct Insulation  
   a. Apply 1 coat of latex paint on insulation which has been sized or primed under other Sections; apply 2 coats on such surfaces when unprepared.  
   b. Match color of adjacent surfaces.  
   c. Remove band before painting, and replace after painting.  
3. Hardware  
   a. Paint prime coated hardware to match adjacent surfaces;  
   b. Paint metal portions of head seals, jamb seals, and astragal seals to match the color of the door frame unless otherwise directed by the Architect.  
4. Exposed Vents: Apply 2 coats of heat resistant paint approved by the Architect.  

3.3 EXTERIOR PAINT SCHEDULE  

A. Cement Plaster  
   1. 100 Percent Acrylic Elastomeric Coating: 2 finish coats over transparent sealer.  

B. Galvanized Metal  
   1. Semi-Gloss Finish: 2 finish coats over primer. Primer is not required on shop-primed items. Reprime all areas where primer has been scratched, scraped, or removed.  
      a. Pre-Treatment for New Galvanized Metal: As manufactured by Dunn Edwards, “Supreme Chemical Metal Clean & Etch, ME01”; Kelly-Moore Paints; Sherwin Williams.  
      b. Primer: As manufactured by Dunn Edwards, “GALVALUM Premium, GAPR00”; Kelly-Moore Paints; Sherwin Williams.  
      c. Finish Coat(s): As manufactured by Dunn Edwards, “SYN-LUSTRO, W-9” or “SPARTASHIELD, SSHL50”; Kelly-Moore Paints; Sherwin Williams.  

C. Ferrous Metal  
   1. Semi-Gloss Finish: 2 finish coats over primer. Primer is not required on shop-primed items. Reprime all areas where primer has been scratched, scraped, or removed.  
      a. Primer: As manufactured by Dunn Edwards, “BLOC-RUST Premium, BRPR00-1 Series”; Kelly-Moore Paints; Sherwin Williams.  
      b. Finish Coat(s): As manufactured by Dunn Edwards, “SYN-LUSTRO, W-9” or “SPARTASHIELD, SSHL50”; Kelly-Moore Paints; Sherwin Williams.
3.4 INTERIOR PAINT SCHEDULE

A. Gypsum Board and Acoustical Gypsum Plaster
   1. Eggshell Finish: 2 finish coats over a wall sealer.

B. Gypsum Board and Wood Intended for Opaque Finish
      b. Finish Coat(s): As manufactured by Dunn Edwards, “SUPREMA, SPMA50” or “SPARTASHIELD, SSHL50”; Kelly-Moore Paints, Sherwin Williams.

C. Galvanized Metal
   1. Semi-Gloss Finish: 2 finish coats over primer. Primer is not required on shop-primed items. Reprime all areas where primer has been scratched, scraped, or removed.
      c. Finish Coat(s): As manufactured by Dunn Edwards, “SYN-LUSTRO, W-9” or “SPARTASHIELD, SSHL50”; Kelly-Moore Paints, Sherwin Williams.

D. Ferrous Metal
   1. Semi-Gloss Finish: 2 finish coats over primer. Primer is not required on shop-primed items. Reprime all areas where primer has been scratched, scraped, or removed.
      b. Finish Coat(s): As manufactured by Dunn Edwards, “SYN-LUSTRO, W-9” or “SPARTASHIELD, SSHL50”; Kelly-Moore Paints, Sherwin Williams.

E. Concrete Floor
   1. Semi-gloss Finish: 2 finish coats; no primer needed.
      a. Finish Coat(s): As manufactured by Devoe High Performance Coatings, “International Tru-Glaze-WB 4426” (available through Kelly-Moore Paints San Lorenzo #614, 15611 Hesperian Blvd., San Lorenzo, CA 94580, phone (510) 276-6492, fax (510) 276-6496, contact Kirk Norlin, Manager, email KNorlin@kellymoore.com); Dunn Edwards; Sherwin Williams.

END OF SECTION
SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Interior Code-related and directional signage as indicated.
   2. Remove and reinstall existing metal letter signage as indicated.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act


1.3 SYSTEM DESCRIPTION

A. Design Requirements: Design all signs as required by ADA and CBC - Title 24.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with ADA and CBC requirements for signage, to include Braille.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer’s product data describing materials and signs.

B. Shop Drawings
   1. Provide shop drawings showing construction details for approval before proceeding with fabrication. Include full size details of exposed edges, joints between materials, hanging, hinging and locking systems and any other details which would affect sign appearance.
   2. Fasteners: Detail methods of fastenings and provide exact specifications for all fasteners noted on shop drawings.
   3. Artwork: Submit full size patterns or prints of typical copy layouts and/or graphic elements to be applied on signs. Using layouts on the Drawings as a guide, optically enlarge and hand correct images before submitting to the Architect for approval before fabrication.
   4. Sign Location: Provide Graphic Schedule and location plans to identify and locate all signs. Item numbers listed in the Graphic Schedule shall be found on location plans and shall identify locations of specific sign items.
C. Samples
1. On 6-inch by 6-inch pieces of actual sign materials, submit to the Architect for review and approval, 3 samples of painted and graphic finishes, in each material, color and finish, with texture to simulate actual conditions.
2. Provide listing of the material and application for each coat of each finish sample.
3. Be prepared to resubmit each sample as requested until required sheen, color and texture are approved.
4. Acrylic: Submit color and finish samples of plastics for approval before proceeding with fabrication. No substitution in color, thickness, finish or plastics will be accepted without written approval of the Architect.
5. Fasteners: Submit 1 sample of all fasteners and hardware for approval.
6. Paint: Submit 3 color and finish samples of all paints and finishes for approval prior to fabrication.

D. Operation and Maintenance: Provide the College’s Project Manager with proper cleaning instructions required for continued maintenance of signs.

1.6 QUALITY ASSURANCE

A. Pre-Installation Conferences: Sign locations shown on the location plans are for general information only. Prior to installation and as required, arrange meetings with the Architect at the site for final location for all sign items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: ASI Sign Systems, Inc.; Superior Sign Systems; Vomar Products, Inc.

2.2 MATERIALS

A. Plastic Signs: Matte finish acrylic plastic, minimum 1/8-inch thick, without frame, with corners radiused. Message and background color shall be sub-surface printed. Provide with raised room numbers and Braille.


C. Fasteners: Where fasteners are indicated or required, use exposed “torx type” tamper-proof security screws.

D. Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are non-fading for the application intended.
2.3 **ACRYLIC SIGNS**

A. Acrylic Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

B. Unframed Acrylic Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
   1. Edge Condition: Square cut.
   2. Corner Condition: 1/2-inch radius.
   3. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16-inch measured diagonally.

C. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

D. Message Inserts: Where sign type makes provision for changeable name slots, provide laser printed name strips with text as scheduled. Obtain message from the College’s Project Manager before fabrication. Where no text is scheduled, insert blank message strip in slot for future text by the College’s Project Manager.

E. Photopolymer (Raised Copy): Machine-cut copy characters from matte finish opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.
   1. Panel Material: Matte-finished acrylic stock with opaque color coating surface applied; 2 colors, minimum 70 percent contrast between color 1 and color 2.
   2. Raised Copy Thickness: Not less than 1/32-inch.

2.4 **FINISHES**

A. Colors: For exposed sign material that requires applied colors and other characteristics related to appearance, see Drawings.

2.5 **BRAILLE SYMBOLS**

A. Braille Symbols: California Contracted Grade 2 Braille shall be used wherever Braille symbols are specifically required in other portions of these standards. Dots shall be 1/10-inch on centers in each cell with 2/10-inch space between cells. Dots shall be raised a minimum of 1/40-inch above the background.
   1. Provide men/women restroom door and wall signs, exit, exit route, and exit stair down signs, and room identification signs in Braille as indicated.

2.6 **BUILDING IDENTIFICATION**

A. Remove and reinstall existing individual metal letters as indicated.
   1. Record layout and letter spacing and submit full size template for reinstallation including stud locations for each letter.
   2. Carefully remove existing letters to preserve existing mounting pins. If pins are missing or damaged, replace with 1/2-inch long threaded studs drilled and epoxied in place. Clean letters prior to reinstallation.
3. When reinstalling existing metal letters, template and drill holes in stucco; set studs with translucent silicone adhesive, as manufactured by GE Momentive, “RTV 118”: Dow Corning; MG Chemicals.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the substrate and conditions in which the work is to be installed. Correct all unsatisfactory substrate and conditions prior to start of installation.

3.2 INSTALLATION

A. General
   1. Install signage in neat and proper manner.
   2. Install sign items, including all components, in accordance with reviewed Graphic Schedule at locations shown.
   3. Install signs properly aligned, level and true to line and dimension.

B. Install with reviewed manufacturer’s adhesive or mechanical fasteners after application of finish painting at heights noted.

3.3 SCHEDULE

A. Signage font, size, color and background color as indicated on the Drawings.

B. Signage shall be in compliance with CBC.

END OF SECTION
SECTION 10 21 13.13
METAL TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Overhead-braced baked enamel steel toilet partitions.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act

B. ASTM - American Society for Testing and Materials
   1. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.


1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product data including data on panel construction, hardware, and accessories.

B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples: Submit 2 samples of partition panels, approximately 3 inches by 5 inches in size, illustrating material and finish. Submit 2 samples of door hardware illustrating material and finish.

D. Manufacturer’s Instructions: Submit manufacturer’s installation instructions. Indicate special procedures and perimeter and attachment conditions requiring special attention.

1.4 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible to ensure proper fitting of work. However, allow for adjustments where taking of field measurements before fabrication might delay work.

B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Bradley Corporation; Global Partitions; Knickerbocker Partition Corporation.

2.2 MATERIALS

A. Baked Enamel Units: Facing sheets and closures fabricated from 80Z (electrolytically zinc-coated) commercial steel sheet for exposed applications that is mill phosphatized and selected for smoothness.

1. General: Provide select material for surface flatness. No discoloration, roller marks, or other imperfections will be accepted. Buff weld burns.

2. Facing Sheet Thicknesses: Minimum base metal (uncoated) thicknesses as follows:
   a. Pilasters: Manufacturer’s standard thickness, but not less than 0.0329-inch.
   b. Panels: Manufacturer’s standard thickness, but not less than 0.0269-inch.
   c. Doors: Manufacturer’s standard thickness, but not less than 0.0269-inch.

3. Finish: Manufacturer’s standard pigmented, organic coating, including thermosetting, electrostatically applied, and powder coatings. Provide coating system that complies with coating manufacturer’s written instructions for pretreatment, application, baking, and minimum dry film thickness.
   a. Color: As selected by the Architect from manufacturer’s standard range.

B. Door, Panel, and Pilaster Construction, General: Seamless, metal facing sheets are pressure laminated to core material. Units have continuous, interlocking molding strip or lapped and formed edge closures. Exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections. Corners are sealed by welding or clips. Exposed welds are ground smooth.

1. Core Material: Manufacturer’s standard sound-deadening honeycomb of resin impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.

2. Grab Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.

3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

C. Door Dimensions: Unless otherwise indicated, furnish 24-inch wide in-swinging doors for ordinary toilet stalls and 34-inch wide (clear opening) out-swinging or in-swinging doors, as indicated, for stalls equipped for accessible use in accordance with ADA requirements in accordance with CBC.

D. Pilaster Shoes and Sleeves (Caps): Stainless steel, ASTM A666, Type 302 or 304, not less than 0.0312-inch specified thickness and 3 inches high, finished to match hardware.
E. Brackets: Full-height (continuous) type; manufacturer's standard design; stainless steel.

F. Overhead Bracing: Manufacturer’s standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer’s standard finish.

G. Hardware: All exposed door hardware shall be as indicated.
   1. Continuous stainless steel self-closing hinge is required. Door hardware shall include a bumper, stop, keeper, and slide latch with emergency access and stainless steel vandal resistant fasteners. At accessible stalls, provide U-shaped pull below latch at 34 inches to 44 inches above finish floor.
   2. Install coat hooks through bolted in side panel at each stall. At accessible stalls, install coat hooks maximum 48 inches above finish floor.

2.3 FABRICATION

A. Overhead-Braced Units: Provide manufacturer’s standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine areas to receive toilet compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that may affect installation of compartments. Report any discrepancies to the Architect.

B. Take complete and accurate measurements of toilet compartment locations.

C. Start of work constitutes acceptance of job.

3.2 INSTALLATION

A. Install compartments in a rigid, straight, plumb and level manner as indicated on the Drawings and in accordance with manufacturer’s installation instructions.

B. All doors and panels to be mounted at 12 inches above the finished floor unless otherwise specified.

C. Clearance at vertical edges of door shall be uniform top to bottom.

D. No evidence of cutting, drilling and/or patching shall be visible on the finished work.

E. Finished surfaces shall be cleaned after installation and be left free of all imperfections.
3.3 PROTECTION

A. Protect assemblies from damage during and after application.

B. Clean and polish materials.

END OF SECTION
SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Toilet accessories, including backing plates for grab bars.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Section
   1. Section 08 83 00 - Mirrors: Provision of mirrors.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act

B. AISI - American Iron and Steel Institute

C. ASTM - American Society for Testing and Materials
   2. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.


1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Comply with Contra Costa College Campus guidelines.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gauges, profiles, mounting method, specified options, and finishes.

B. Shop Drawings: Submit setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.

C. Contract Closeout Submittals: Submit maintenance instructions including replaceable parts and service recommendations.
1.5 QUALITY ASSURANCE

A. Regulatory Requirements
1. Grab Bars and Fasteners: Strength of grab bars, fasteners and mounting devices shall comply with CBC Section 1115B.8 and ADA requirements.
2. Grab Bar Surfaces: Conform to CBC Section 1115B.8.4.
4. Operating Pressure for Soap Dispensers: Comply with ADA.

B. Inserts and Anchorages: Furnish accessory manufacturers’ standard concealed inserts and anchoring devices. Coordinate delivery with other work to avoid delay.

1.6 PROJECT CONDITIONS

A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.7 WARRANTY

A. Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within warranty period.

B. Warranty Period: 10 years from date of Substantial Completion.

C. Warranty shall not deprive the College of other rights the College may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS


2.2 MATERIALS

A. Materials - General: Fabricate toilet accessory items form the following materials and according to requirements specified for individual accessory items.
1. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum thickness, unless otherwise indicated.
2. Sheet Steel: Cold-rolled, commercial quality, 20 gauge minimum thickness, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
6. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.
7. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply. Provide a minimum of 6 keys to the College.

2.3 ACCESSORIES

A. Provide the following accessories:
2. Toilet Tissue Dispensers
   a. Type 1: Surface-mounted, dispenses one 13-inch diameter by 3.8-inch wide tissue roll with 3.25-inch diameter core, gray plastic body and smoked transparent cover, as manufactured by Kimberly-Clark Professional, “JRT Dispenser, 09612”; Bobrick Washroom Equipment, Inc.; American Specialties, Inc.
   1) Provide with Scott Jumbo-Roll Toilet Tissue.
7. Mirror: As specified in Section 08 83 00.

B. Underlavatory Guards
1. Molded vinyl covering for supply and drain piping with flip tops at valve to allow service access without removing coverings.
2. Product: As manufactured by Brocar Trap Wrap, “C500R”; Trubro Lav Guard; IPS Corporation.
C. Mounting Plates: Non-corrosive material. Provide as required.

2.4 FABRICATION

A. General: Only a maximum 1-1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by the Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer’s name and product model number.

B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

2.5 FINISHES

A. Stainless Steel: 630 Satin Stainless Steel, unless otherwise noted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units according to manufacturer’s instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer’s instructions for type of substrate involved.

C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F446.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces strictly according to manufacturer’s recommendations after removing temporary labels and protective coatings.

END OF SECTION
MATERIALS:
18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. All-welded construction with beveled opening.

OPERATION:
Dispenses single- or half-fold paper toilet seat covers from beveled opening. Dispenser fills from bottom through concealed opening. Capacity: 500 toilet seat covers.

INSTALLATION:
Mount unit on wall or toilet partition with two flat-head screws, not furnished by manufacturer, at points indicated by an S. For plaster or dry wall construction, provide concealed backing that complies with local building codes, then secure unit with flat-head screws not furnished. For other wall surfaces, provide fiber plugs or expansion shields for use with screws, not furnished, or provide 1/8" (3mm) toggle bolts or expansion bolts.

Note: Provide a 5" (125mm) minimum clearance from bottom of dispenser to top of any horizontal projection to provide room for filling dispenser from bottom.

SPECIFICATION:
Surface-mounted toilet-seat-cover dispenser shall be type-304, 22-gauge (0.8mm) stainless steel with all-welded construction; exposed surfaces shall have satin finish. Dispenser shall have a concealed opening in bottom for filling. Capacity shall be 500 paper toilet seat covers.

Surface-Mounted Seat-Cover Dispenser shall be Model B-221 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
K-C PROFESSIONAL* JRT Jumbo Roll Bathroom Tissue Dispenser

CODE  09612

SIZE : 16.0" x 13.88" x 5.75" / 40.6cm x 35.3cm x 14.6cm

COLOR : SMOKE

The JRT Jumbo Roll Bathroom Tissue Dispenser gives you a graceful look. It is curved and contemporary. Designed for easier access to tissue. Replaceable lock with push button option, extras included on back of dispenser. When installed properly, this dispenser meets the ADA Standards for Accessible Design.

Spare Parts and Keys

Availability :  North America

Package Dimensions

Packaging Level 1 :  1 Case = 1 Package(s)
Packaging Level 2 :  1 Package = 1 Unit(s)
Packaging Level 3 :  1 Case = 1 Unit(s)
**MATERIALS:**
- **Cabinet** — 18-8, type-304, 22-gauge (0.8mm) stainless steel. Welded construction. Exposed surfaces have satin finish.
- **Flange** — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Drawn, one-piece, seamless construction. Radius on corners and return edges complement corners and edges of door.
- **Door** — 18-8, type-304, 22-gauge (0.8mm) stainless steel with 18-gauge (1.2mm) stainless steel door frame. Exposed surfaces have satin finish. Front of door is drawn, one-piece, seamless construction and has same degree of arc as other Bobrick ConturaSeries washroom accessories. Radius on corners and edges of door complement other ConturaSeries accessories. Secured to cabinet with two rivets. Equipped with a flush tumbler lock keyed like other Bobrick washroom accessories.
- **Dispensing Mechanism, Inner Housing, and Cam** — 18-8, type-304, 18-gauge (1.2mm) stainless steel.
- **Spindles (2)** — Heavy-duty, one-piece, molded ABS. Theft-resistant, spindles retained in dispensing mechanism when door is locked.

**OPERATION:**
Unit holds two standard-core toilet tissue rolls up to 5-1/4" (133mm) diameter (1800 sheets). Tissue rolls are loaded and locked into dispensing mechanism. Extra roll automatically drops in place when bottom roll is depleted. Depleted rolls can only be removed after unlocking door.

**INSTALLATION:**
Provide framed rough wall opening 6-1/4" wide x 11-1/4" high (160 x 290mm). Minimum recessed depth required to finish face of wall is 3-1/8" (80mm). Allow clearance for construction features that may protrude into opening from opposite wall. Coordinate with mechanical engineer to avoid pipes, vents, and conduits. Mount unit in wall opening with shims between framing and cabinet at all points indicated by an S, then secure unit with four #10 x 5/8" (4.8 x 16mm) sheet-metal screws (not furnished).

**SPECIFICATION:**
Recessed multi-roll toilet tissue dispenser shall be type-304 stainless steel with welded construction, including dispensing mechanism, inner housing and cam; exposed surfaces shall have satin finish. Front of toilet tissue dispenser door shall be drawn, one-piece, seamless construction and shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of flange and door shall complement other Bobrick ConturaSeries washroom accessories. Door shall be secured to cabinet with two rivets and equipped with a flush tumbler lock keyed like other Bobrick washroom accessories. Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" (133mm) diameter (1800 sheets). Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two heavy-duty, one-piece, molded ABS spindles. Theft-resistant, spindles retained in dispensing mechanism when door is locked.

Recessed Multi-Roll Toilet Tissue Dispenser shall be Model B-4388 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
MATERIALS:

Cabinet — 18-8, type-304, heavy-gauge stainless steel. All-welded construction. Exposed surfaces have satin finish.

Door — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Secured to cabinet with a full-length stainless steel piano-hinge. Equipped with a tumbler lock keyed like other Bobrick washroom accessories.

Disposal Panels (2) — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Bottom edges hemmed for safety. Secured to door and permanent panel with spring-loaded, full-length stainless steel piano-hinge. Equipped with international graphic symbol identifying sanitary napkin disposal.


OPERATION:

Unit is equipped with a self-closing panel covering each disposal opening. Napkin disposal is emptied by opening door with furnished key and removing waste receptacle.

INSTALLATION:

For partitions with particle-board or other solid core, secure with four #8 x 1-1/4" (4.2 x 32mm) sheet-metal screws (not furnished), or provide through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with #8 x 1-1/4" (4.2 x 32mm) sheet-metal screws.

For other wall surfaces, provide fiber plugs or expansion shields for use with #8 x 1-1/4" (4.2 x 32mm) sheet-metal screws, or provide 3/16" (5mm) toggle bolts or expansion bolts.

SPECIFICATION:

Surface-mounted sanitary napkin disposal shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Door shall be secured to cabinet with a full-length stainless steel piano-hinge and equipped with a tumbler lock keyed like other Bobrick washroom accessories. Unit shall have a self-closing panel covering each disposal opening. Panel shall have bottom edge hemmed for safety, be secured to door with spring-loaded, full-length stainless steel piano-hinge, and equipped with international graphic symbols identifying sanitary napkin disposal. Unit shall be furnished with a removable, leak-proof molded polyethylene receptacle. Receptacle shall have a capacity of 1.2-gal. (4.6-L).

Surface-Mounted Sanitary Napkin Disposal shall be Model B-254 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
MATERIAL:


Wall Bracket — Grey, high-impact-resistant ABS. Equipped with a concealed locking device to secure the lid and a removable plastic key to disengage locking device.

Container — Black, translucent ABS. Capacity: 40-fl oz (1.2-L).

Lid — Grey, high-impact-resistant ABS.

OPERATION:

Corrosion-resistant valve dispenses commercially marketed all-purpose hand soaps. Valve is operable with one hand, without tight grasping, pinching, or twisting of the wrist, and with less than 5 pounds of force (22.2 N) to comply with accessible design (including ADAAG in U.S.A.). Large-capacity, translucent container provides visible soap level. To fill container, use the plastic key provided or any small pointed object to push in the concealed locking device located at upper left side of wall bracket; lid will automatically pop forward. Lid swings up to top fill only after lock is disengaged. After filling, swing lid down and push it toward the wall; a click sound confirms lid is locked. Soap container is removable for maintenance or replacement by opening the lid, pushing back on the container stop spring tab and sliding the container up off the wall bracket. Replace the lid before mounting the container onto the wall bracket.

INSTALLATION:

Remove plastic key from wall bracket. Provide (3) #10 x 1-1/2" (M5 x 38mm) mounting screws to mount the wall bracket on wall at points indicated by an S. For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with screws. For other wall surfaces, provide plug or expansion shield with screws, or provide 1/8" (3mm) toggle bolts or expansion bolts. For mirrors or glass surfaces, use pressure-sensitive tape strips furnished by manufacturer: Apply tape to back of wall bracket within outlined areas; press wall bracket onto glass surface; then allow the tape to set 24 hours before mounting the container and filling with soap. Hold lid upright in-line with wall bracket and slide its two pivot points into upper left and right slots of wall bracket; a click sound will be heard when lid is properly in place. With lid in the upright (open) position, slide container down into the wall bracket’s V-shaped groove. Swing lid down and push it toward the wall; a click sound confirms lid is locked.

Note: Provide 4" (100mm) minimum clearance from lid to underside of any horizontal projection for top filling and 5" (125mm) minimum clearance to the left of unit for disengaging the concealed locking device. Push buttons should be located 44" (1120mm) maximum above the finish floor.

SPECIFICATION:

Soap dispenser shall have grey, high-impact-resistant ABS wall bracket, lid, push button, and spout. Bracket shall be equipped with a locking device to secure lid, container, and a removable plastic key to disengage locking device. Vandal-resistant lid shall pivot up for top filling only after lock is disengaged. Corrosion-resistant valve shall have soap head-holding mushroom valve, stainless steel spring, U-packing seal, and duckbill; and shall dispense commercially marketed all purpose hand soaps. Valve shall be operable with one hand and with less than 5 pounds of force (22.2 N) to comply with accessible design (including ADAAG in U.S.A.). Container shall be black, translucent ABS with a capacity of 40-fl oz (1.2-L), be retained to the wall bracket by a sliding latch and a container stop spring tab and shall be removable for maintenance or replacement.

Soap Dispenser shall be Model B-40 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
K-C PROFESSIONAL* LEV-R-MATIC* Roll Towel Dispenser

CODE  09765

SIZE : 13.3" x 13.5" x 9.8" / 33.8cm x 34.3cm x 24.9cm

COLOR : SMOKE

LEV-R-MATIC* Roll Towel Dispenser - 1.5" hub. Automatic feed feature to allow loading with one hand. Translucent, smoked plastic design allows you to see inside so you know exactly when a refill is needed, without having to open the dispenser. When installed properly, these dispensers meet the ADA Standards for Accessible Design, 28CFR Part 36 (1994), local rules may vary.

Spare Parts and Keys

Availability : North America

Package Dimensions

Packaging Level 1 : 1 Case = 1 Package(s)
Packaging Level 2 : 1 Package = 1 Unit(s)
Packaging Level 3 : 1 Case = 1 Unit(s)
MATERIALS:
Waste Receptacle — 22-gauge (0.8mm) stainless steel with satin finish. Equipped with vinyl bumper strip and rubber feet. Hooks are provided to attach optional, removable liner (not provided) to upper interior corners.

Cover — 22-gauge (0.8mm) stainless steel with satin finish. Two spring-loaded, self-closing doors, which have an international graphic symbol to identify waste disposal, are secured with full-length, stainless steel piano-hinges.

OPERATION:
Entire cover is removable for easy servicing of receptacle. Vinyl bumper strip and rubber feet on waste receptacle protect wall and floor surfaces.

Designer’s Note: Vinyl liners for waste receptacle are available from Bobrick as an accessory. Check the chart above for correct liner part number to order.

SPECIFICATION:
Waste receptacle shall be 22-gauge (0.8mm) stainless steel. Exposed surfaces shall have satin finish. Waste receptacle shall be equipped with vinyl bumper strip and rubber feet. Capacity shall be __________(insert capacity).

Waste Receptacle shall be Model __________(insert model number) of Bobrick Washroom Equipment, Inc. Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

- Satin finish
- Satin finish with peened gripping surface; add suffix .99 to model number

HORIZONTAL

<table>
<thead>
<tr>
<th>Finish</th>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-6806 x 12, 18, 24, 30, 36, 42, 48</td>
<td>32&quot; 815mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>39-7/8&quot; 1015mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>27-7/8&quot; 710mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>4&quot; 100mm</td>
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VERTICAL

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<thead>
<tr>
<th>Finish</th>
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<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-68137</td>
<td>30-7/8&quot; 1005mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>34-3/4&quot; 885mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>19-3/4&quot; 500mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>3-1/8&quot; 80mm</td>
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TWO-WALL WHEELCHAIR TOILET COMPARTMENT

<table>
<thead>
<tr>
<th>Finish</th>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-6897</td>
<td>45-7/8&quot; 1165mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>50&quot; 1270mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>57-7/8&quot; 1470mm</td>
</tr>
</tbody>
</table>

HORIZONTAL TUB / SHOWER / TOILET COMPARTMENT BAR 24 x 36

<table>
<thead>
<tr>
<th>Finish</th>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-68616</td>
<td>32&quot; 815mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>24&quot; 610mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>27-7/8&quot; 710mm</td>
</tr>
</tbody>
</table>

HORIZONTAL TWO-WALL BAR for Shower Stall

<table>
<thead>
<tr>
<th>Finish</th>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-6861</td>
<td>15-7/8&quot; 405mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>26-7/8&quot; 685mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>34-3/4&quot; 885mm</td>
</tr>
</tbody>
</table>

TWO-WALL TOILET COMPARTMENT BAR 42 x 54

<table>
<thead>
<tr>
<th>Finish</th>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satin</td>
<td>B-6897</td>
<td>45-7/8&quot; 1165mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>50&quot; 1270mm</td>
</tr>
<tr>
<td>Satin</td>
<td></td>
<td>57-7/8&quot; 1470mm</td>
</tr>
</tbody>
</table>

continued...
MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish. 1-1/2” (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2” (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 1/8” (3mm) thick, stainless steel plate; end flanges 2” x 3-1/8” (50 x 80mm) with two holes for attachment to wall. Intermediate flanges 2-5/8” x 3-1/8” (65 x 80mm) wide x 3-1/8” (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4” (85mm) diameter x 1/2” (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2” (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength.

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with two screws in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. Note: Make sure to leave a space of just over 1/8” (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4” or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. Mounting Kits — Bobrick offers a mounting kit for installing grab bars; one Bobrick mounting kit is required for each flange.

<table>
<thead>
<tr>
<th>Mounting Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>252-30</td>
<td>Consists of #14 x 2½” type-304 stainless steel, Phillips round-head, sheet-metal screws.</td>
</tr>
</tbody>
</table>

2. Grab Bar Fastener — Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; one Bobrick fastener is required for each flange. Install grab bar without backing in wall requires minimum 5/8” (16mm) thick painted or tilled drywall.

<table>
<thead>
<tr>
<th>WingIt™ Fastener No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>251-4</td>
<td>Consists of 10–32 x 5/16” round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.</td>
</tr>
</tbody>
</table>

3. Optional Anchor Device — Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. One Bobrick concealed anchor device is required for each flange.

<table>
<thead>
<tr>
<th>Optional Anchor No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2583</td>
<td>Anchor for 3/4” to 1” (19-25mm) panel 1 anchor required for each flange.</td>
</tr>
<tr>
<td>2586</td>
<td>Anchor for 1/2” to 1” (13mm) panel 1 anchor required for each flange.</td>
</tr>
</tbody>
</table>

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2” (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2” (38mm). Concealed mounting flanges shall be 1/8” (3mm) thick stainless steel plate. 2” x 3-1/8” (50 x 80mm), and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4” (85mm) diameter x 1/2” (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model __________ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.
SECTION 12 36 61.16
SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Solid surfacing countertops and splashes.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections
   1. Section 05 50 00 - Metal Fabrications: Provision of countertop supports.
   2. Section 07 92 00 - Joint Sealants: Provision of sealants.
   3. Division 22 - Plumbing: Provision of plumbing fixtures.

1.2 REFERENCES

A. ANSI - American National Standards Institute
   1. Z124.3 - Plastic Lavatories.

B. WI - Woodwork Institute

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product literature.

B. Shop Drawings: Show all items at large scale including methods of fabrication and construction.

C. Samples: Submit 3 solid surfacing materials, 6 inches square.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: DuPont, “Corian”; CaesarStone; Silestone.

2.2 MATERIALS

A. Solid Surfacing: Homogeneous solid sheets of filled plastic resin complying with the material and performance requirements of ANSI Z124.3, Type 5 or Type 6, without a precoated finish.
   1. Thickness: As indicated.
   2. Color: As selected by the Architect.

B. Plywood Backing for Countertops: Provide 1/2-inch marine plywood.

C. Sealant: As specified in Section 07 92 00.
2.3 FABRICATION

A. Quality Standard: Comply with WI Section 17D, “Decorative Synthetic Marble Countertops and Sinks”.
   1. Grade: Premium.
   2. Thickness of solid surfacing shall be constant and shall not vary.

B. Fabricate tops in 1 piece with shop-applied edges, unless otherwise indicated. Comply with solid surfacing material manufacturer’s recommendations for adhesives, sealers, fabrication, and finishing.
   1. Drill holes in countertops for plumbing fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor countertops securely to support systems as indicated. Caulk space between countertop and wall with specified sealant.
   1. Install countertops with no more than 1/8-inch in 96 inch sag, bow, or other variation from a straight line.

B. Seal joints in accordance with manufacturer’s instructions.

3.2 ADJUSTING AND CLEANING

A. Remove damaged or otherwise disfigured portions and replace with new prior to the College’s acceptance.

END OF SECTION
SECTION 12 48 43

FLOOR MATS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Rubber-backed walk-off entrance mat.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUBMITTALS

A. Product Data: Submit product data for each type of floor mat specified.

B. Samples: Submit samples for verification in the form of 12-inch square assembled sections of floor mat.

C. Contract Closeout Submittals: Submit maintenance data in the form of manufacturer’s printed instructions for cleaning and maintaining floor mats.

PART 2 - PRODUCTS

2.1 MANUFACTURERS


1. Basis of design is “Berkshire”; contact The Patton Group at 415/722-6572.

2.2 WALK-OFF ENTRANCE MAT

A. Mat: 100 percent solution dyed polypropylene fiber with rubber backing; 1/2-inch thick; width approximately 6 feet-7 inches; length approximately 82 feet; weight 81.4 ounces per square yard; color Black Walnut.

1. Provide with manufacturer’s standard sew-on nosing.

2.3 FABRICATION

A. Shop fabricate mats to greatest extent possible in sizes as indicated. Where not otherwise indicated, provide each mat as a single unit, not exceeding manufacturer’s recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Subfloors shall be clean and dry. Inspect all substrates and subfloors for proper tolerances and report any discrepancies to the general contractor in writing.

B. Preinstallation Measurements: Verify actual measurement by field measuring before any onsite cutting, if applicable. To avoid construction delays, coordinate field measurements based upon construction progress.

3.2 INSTALLATION

A. Install surface-type units to comply with manufacturer’s written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

B. For surface-mounted applications, provide tapered vinyl moldings with flanges sewn to back of mat on all 4 sides with mitered corners.

3.3 CLEANING

A. General: Clean up job site, including sweeping or dust mopping the floor to remove all dirt or grit, and put all waste in general contractor’s dumpster.

B. Initial Maintenance: Conduct a full initial maintenance following the latest edition of the manufacturer’s maintenance instructions (available from www.matsinc.com). Instruct College’s cleaning staff in proper maintenance procedures.

END OF SECTION
SECTION 12 61 00

FIXED AUDIENCE SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Remove and reinstall existing fixed seating as indicated.
2. New fixed seating as indicated to match existing.

B. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

A. FS - Federal Specification
   1. FF-B-575 - Bolts, Hexagon and Square.
   2. FF-S-325 - Shield, Expansion, Nail, Expansion, and Nail, Drive Screw (Devices, Anchoring, Masonry).

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. Comply with Title 24 regulations.
   2. Install seating with end standards aligning from first to last row and with backs and seats varied in width, optimizing sightlines.
   3. Expansion fasteners shall conform to all Code requirements and regulations.

1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings showing seating layout, seat-numbering scheme, chair sizes, and aisle widths.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is certified in writing by the seating manufacturer as qualified to install manufacturer’s seating.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: KI Inc.; Hussey Seating Company; Seating Concepts.

2.2 MATERIALS

A. Fixed Seating: Relocate existing seating and provide new seating to match existing where indicated on the Drawings.
B. Drilled-In Expansion Anchors: FS FF-S-325, Group VIII (anchors, expansion, drilled-in only), Type 1 (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.
   1. Expansion anchors shall be furnished by the original fixed seating manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer’s printed instructions for installation.

B. Standards: Anchored with not less than 2 anchoring devices.

C. Install seating using manufacturer’s recommended hardware and fasteners. Seating in curved rows shall be installed at smooth radius.

D. Verify moving components operate smoothly and quietly.

3.2 PROTECTION

A. Repair minor abrasions and imperfections in painted finishes with a coating that matches the factory-applied finish.

B. Replace upholstery fabric damaged during installation. Replacement for damage is Contractor’s cost.

C. No wet cleaning permitted.

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, incidentals, 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. Content 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. 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. ASCE-7 - ASCE-7 Minimum Design Loads for Buildings and Other Structures
7. ASHRAE - American Society of Heating, Refrigerating 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
14. CFR - Code of Federal Regulations
15. CSA - CSA International
16. DSA - Division of the State Architect
17. EPA - Environmental Protection Agency
18. ETL - Electrical Testing Laboratories
19. FCC - Federal Communications Commission
20. FDA - Food & Drug Administration
21. FM - FM Global
22. FM Global - FM Global Approval Guide
23. IAPMO - International Association of Plumbing and Mechanical Official
24. ICC - International Code Council
25. IEC - International Electrotechnical Commission
27. HI - Hydraulic Institute Standards
28. ISO - International Organization for Standardization
29. MSS - Manufacturers Standardization Society
30. NEC - National Electric Code
31. NEMA - National Electrical Manufacturers Association
32. NFPA - National Fire Protection Association:
   a. NFPA 13 - Standard for the Installation of Sprinkler Systems
   b. NFPA 25 - Standard for Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
   c. NFPA 70 - National Electrical Code
   d. NFPA 72 - National Fire Alarm and Signaling 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. TIMA - Thermal Insulation Manufacturers Association
38. UL - Underwriters Laboratories Inc.
39. USDA - United States Department of Agriculture

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. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "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.

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 21, Fire Suppression 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 Item. Highlight connections by/to other trades.

   b. 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.

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 21, Fire Suppression Sections for additional submittal requirements outside of these requirements.

5. 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.

6. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

7. 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, including resulting charges for work performed under other Divisions, 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.

8. Shop Drawings:

   a. 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.

b. Provide Shop Drawings which indicate information required by NFPA 13. Include room names and fire sprinkler occupancy hazard classifications.

c. Provide Shop Drawings illustrating information for Hydraulic Information Sign for each hydraulic remote area calculated.

d. Utilizing the Reflected Ceiling backgrounds, provide Shop Drawings illustrating locations of fire sprinklers and piping.

e. Utilizing the Structural backgrounds, provide Shop Drawings illustrating locations and types of hangers and sway braces.

f. Provide Shop Drawings illustrating each type of hanger, including fasteners to structure.

g. 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.

h. Provide Shop Drawings illustrating information for Sprinkler System General Information Sign.

i. When required, provide Coordination Drawings.

j. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

k. Provide details of hanger, sway bracing and branch line restraint attachments to structure and to piping. Include details on the size and load capacities of fasteners. Provide verification of the structural capacity to withstand seismic load.

l. Provide sway bracing calculations on drawings showing horizontal seismic design load and requirements, with indication of zone of influence for each bracing location.

m. Clearly indicate the elevation of the highest sprinkler in relation to the elevation of the flow test pressure gauge monitor hydrant.
9. Samples: Provide samples when requested by individual Sections.

10. 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. Clearly indicate changes on Drawings and cloud changes in the submittals.

   b. Resubmit for review until review indicates no exceptions taken or make "corrections as noted".

11. Operation and Maintenance Manuals/Owners Instructions:

   a. Submit, at one time, 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.

      1) Include copies of certificates of code authority acceptance, code-required acceptance tests; test reports and certificates.

      2) 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.

      3) Catalog description of each item of equipment actually installed on job.

      4) Instructions for operation and maintenance of fire suppression systems composed of operating instructions, maintenance instructions and manufacturer's literature as follows:

         a) Testing and Maintenance Schedule Chart: Provide an 8-1/2- by 11-inch typewritten list of each item of installed equipment requiring testing inspection, lubrication or service, describing and scheduling performance of maintenance.

         b) 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.

      5) Include product certificates of warranties and guarantees.
6) Include Record Drawings,

7) Include Contractor’s Material and Test Certificates for Aboveground Piping/Underground Piping.

8) Include a copy of NFPA 25.

9) Include a copy of valve charts and whether normally open or normally closed.

10) Include a copy of drain, auxiliary, and low point drains charts.

11) 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.

12) 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.

13) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub-assemblies.

14) 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 21 00 00, Fire Suppression 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.

12. 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 Item. 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. Invert elevations and dimensioned locations for water services and drainage piping below grade extending to 5-feet outside building line.

e. 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.

f. See Division 21, Fire Suppression 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. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

C. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

D. 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 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, fire alarm, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including fire alarm 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, hangers 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.

2.3 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements, Division 08, Openings and individual Division 21, Fire Suppression Sections. In 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 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) Two hour rated: Karp KPF-350FR.
      5) Manufacturers: Karp, 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 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. Firestopping:
   1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection.
   2. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and 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.

E. 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.

F. 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 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 Risk 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.


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. Prior to covering walls.

2. Prior to ceiling cover/installation.

3. When main systems, or portions of, are being tested and ready for inspection by AHJ.

4. When mains or branchlines are to be permanently concealed by construction or insulation systems.

5. 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 and DSA. 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 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. 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.

B. In absence of specific requirements, comply with individual Division 21, Fire Suppression Sections and 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 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize fire protection equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.
3.18 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
SECTION 21 05 00
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Aboveground Black Steel Pipe and Fittings
   2. Wall and Floor Penetrations and Sleeves
   3. Hangers and Supports
   4. Struts and Strut Clamps
   5. Sway Braces and Restraints
   6. Pipe Valve and Fire Protection Equipment Identification
   7. Signs
   8. Drains

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 23, Heating, Ventilating and Air Conditioning
   3. Division 26, Electrical
   4. Section 21 00 00, Fire Suppression Basic Requirements
   5. Section 21 13 00, Fire Suppression Sprinkler Systems

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.

B. In addition, meet the following:


2. Where pressures are expected to exceed 175 PSI, provide products for high pressure or extra high pressure service.

3. Provide per AHJ requirements.

4. References to product Specifications for materials are listed according to accepted ANSI, ASTM, ASME, AWWA and other base standards. Materials to meet latest approved versions of these standards.

5. See Section 21 00 00, Fire Suppression Basic Requirements where piping materials are approved for use.

6. Fire Suppression Screw-Thread Connections: Comply with local fire department/fire marshal regulations for sizes, threading and arrangement of connections for fire department equipment to fire department connections.

7. Products, coatings, packing oils, cutting oils, lubricants, water supply additives, cable, wiring, firestopping materials, pipe, fittings and appurtenances to be chemically compatible with non-metallic pipe.

8. Manufacturers: Unless an item is marked “No substitutions”, submit substitution request for materials of other than named manufacturers.

9. Noise and Vibration:
a. Install vibration isolators and measures required to prevent noise and vibration from being transmitted to occupied areas. Select equipment to operate within noise coefficient (NC) design level for particular type of installation in relation to its location.

b. After installation, make proper adjustments to reduce noise and vibration to acceptable levels as defined by Architect.

c. In acoustically sensitive areas, design system in a manner that minimizes the number of wall penetrations.

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. Flow Test:

1. Flow: 893 GPM at a residual pressure of 48 PSI.

2. Static Pressure: 58 PSI.

3. Location: See map in report.

4. Elevation: 0-feet above finished floor.

5. Date: April 1, 2014.

6. Information Provided By: Contra Costa Community College.

1.8 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Aboveground Black Steel Pipe and Fittings:

1. Pipe:

a. Bull Moose Tube
b. Or approved equivalent

2. **Fittings, Mechanical and Grooved Couplings:**
   a. Grinnell
   b. Or approved equivalent.

3. **Fittings, Threaded:**
   a. Smith-Cooper International
   b. Anvil International
   c. Ward Manufacturing
   d. Aegis Technologies
   e. Or approved equivalent.

4. **Fittings, Rubber Gasketed:**
   a. Grinnell
   b. Or approved equivalent.

5. **Fittings, Welded:**
   a. Anvil International
   b. Shurjoint Piping Products Incorporated
   c. Smith-Cooper International
   d. State Pipe & Supply, Incorporated
   e. Or approved equivalent.

6. **Fittings, Flanged:**
   a. United Brand Fittings
   b. U.S. Pipe
   c. Anvil S.P.F.
   d. Iowa Fittings Company
e. Victaulic Groove/Flange Adapter  
f. Tyco Fire Products; Grinnell Groove/Flange Adapter  
g. Or approved equivalent.

B. Wall and Floor Penetrations and Sleeves:
   1. Allied Rubber and Gasket Company, Incorporated, dba ARGCO  
   2. Fire Protection Products Incorporated  
   3. Trumbel Link-Seal  
   4. Eaton Crouse-Hinds Link-Seal  
   5. Or approved equivalent.

C. Hangers and Supports:
   1. Cooper B-Line Tolco  
   2. ITW Buildex Sammys  
   3. Or approved equivalent.

D. Struts and Strut Clamps:
   1. Struts:  
      a. Cooper B-Line Tolco  
      b. Or approved equivalent.  
   2. Strut Clamps:  
      a. Cooper B-Line Tolco; Model B2400.  
      b. Or approved equivalent.

E. Sway Braces and Restraints:
   1. Cooper B-Line Tolco  
   2. Or approved equivalent.

F. Pipe Valve and Fire Protection Equipment Identification:
1. Fire Protection Products, Incorporated
2. Allied Rubber and Gasket Company, Incorporated, dba ARGCO
3. Or approved equivalent.

G. Signs:
1. Tyco Fire Products
2. Reliable Automatic Sprinkler
3. Viking Corporation
4. Allied Rubber and Gasket Company, Incorporated, dba ARGCO
5. Or approved equivalent.

H. Drains:
1. Reference Aboveground Black Steel Pipe and Fittings.
2. AGF
3. Victaulic
4. Or approved equivalent.

2.2 ABOVEGROUND BLACK STEEL PIPE AND FITTINGS

A. Wet Pipe Systems:

2. Pipe Size 2-inch Diameter and Larger: ASTM A53, ASTM A135, or ASTM A795; minimum of 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. Dry Pipe Systems:
1. Pipe Size 2-inch Diameter and Smaller: ASTM A53, ASTM A135, or ASTM A795; Schedule 40 only, shop welded, threaded.
2. Pipe Size 2-1/2-inch Diameter and Larger: ASTM A53, ASTM A135, or ASTM A795; Schedule 40, shop welded or with cut grooves.

C. Exposed pipe 8-feet or less above finished floor: Minimum of Schedule 40.

D. Joints:
   1. Threaded, flanged or bevel welded.
   2. Piping installed in plenums or shafts to have welded joints.

E. 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:
      a. Cast iron; Class 125 and 250, ASME B16.1.
      b. Raised ground face, bolt holes spot faced.
   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. Mechanical Fittings and Grooved Couplings:
      a. Couplings: 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.

F. Anti-Microbial Coating: Factory-applied coating to inhibit corrosion from microbiological organisms.

2.3 WALL AND FLOOR PENETRATIONS AND SLEEVES

A. Below Grade and High Water Table Areas: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal.

2.4 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: Ferrous.

C. Hanger Rods:
   1. Concealed Spaces: Continuously threaded or threaded ends.
   2. Exposed Spaces: Threaded ends.

D. Finishes:
   1. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
   2. Use non-metallic coatings such as plastic, felt, epoxy paint, or non-adhesive isolation tape on attachments for electrolytic protection where attachments are in direct contact with dissimilar metals such as copper tubing.

E. Materials:
   1. Use carbon steel pipe hangers and supports, metal trapeze pipe hangers and attachments for general service applications.
   2. Use corrosion-resistant attachments for highly corrosive or hostile environment applications.
   3. Use copper coated or plastic coated pipe hangers and copper attachments for copper piping and tubing.
F. Anti-Scratch Padding: Use padded hangers for piping subject to scratching.

2.5 STRUTS AND STRUT CLAMPS

A. Electro-galvanized steel.
B. Designed for supporting pipe runs from strut supports.
C. UL listed for pipe up to 8-inches in diameter.

2.6 SWAY BRACES AND RESTRAINTS

A. Sway Bracing: From a single manufacturer and compatible with sway brace calculation program.

2.7 PIPE VALVE AND FIRE PROTECTION EQUIPMENT IDENTIFICATION

A. Engraved plastic laminate or corrosion resistant metal sign or plastic equipment marker.
B. Corrosion-resistant chain or permanent adhesive.

2.8 SIGNS

A. Engraved plastic laminate or corrosion resistant metal sign or plastic equipment marker.
B. Corrosion-resistant chain or permanent adhesive.

2.9 DRAINS

A. Reference Aboveground Black Steel Pipe and Fittings.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install in conformance with UL Listing, FM Approval or ICC-ES requirements and restrictions.

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. In areas visible to public, route and install pipe so as to minimize visual impact.

4. 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.

5. 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: Wire pipe cutout coupon at point of pipe penetration.

D. Pipe and Pipe Fittings:

1. 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.

2. Install piping in concealed spaces above finished ceilings. Prior to design and installation, obtain pre-approval by Architect for exposed piping.

3. In open-to-structure areas which are open to public view, route exposed piping to minimize visual impact. Obtain Architect's and Engineer's approval of exposed piping installation.

4. Coordinate support of pipe 4-inches and larger with Structural Engineer.

5. Provide clearances around piping per NFPA 13.

6. 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.

7. 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.

8. Route water filled and dry system piping around, not into or through, rooms protected by pre-action systems, clean-agent systems, gaseous suppression systems and other alternative fire suppression systems.

9. Install piping as close as possible to ceiling to avoid conflicts with other trades.

10. Install pipe runs to minimize obstruction to other work.

11. Pitch pipe for dry system piping located or passing through warm as well as cold areas.

12. Install welded pipe with welds facing vertically up, or where this is not possible, as close as possible to vertical between 46 degrees and 234 degrees. Intent is to minimize corrosion caused by moisture int he bottom of pipes.

3.3 WALL AND FLOOR PENETRATIONS AND SLEEVES

A. Escutcheons:

1. Install on exposed pipes passing through walls or floors.

   a. Pipe Sleeves: Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.

   b. Floor Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1-inch above finished floor. Caulk pipes passing through floor with nonshrinking fire and water resistant 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. Provide fire-rated assemblies per local AHJ requirements.

   c. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with non-shrinking 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.
d. Beam Sleeves:

   1) 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. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.

   2) Firestopping penetrations in fire-rated wall/floor assemblies.

   3) Reference Division 07, Thermal and Moisture Protection.

   4) Coordinate with Drawings location of fire rated walls, ceilings and floors. When these assemblies are penetrated, seal around piping and equipment with approved firestopping material.

   5) 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 and NFPA.

   6) Install firestopping material complete as directed by manufacturer’s installation instructions. Meet requirements of ASTM E814.

3.4 HANGERS AND SUPPORTS

   A. Installation of pipe hangers, inserts and supports to conform to NFPA 13. Provide adjustable hangers, inserts, brackets, clamps, supplementary steel and other accessory materials required for proper support of pipe lines and equipment. Provide supplementary materials for proper support and attachment of hangers.

   B. Space pipe hangers no more than 4-feet on center for exposed sprinkler pipe located 8-feet or less above finished floor.

   C. Limit branch line overhangs to 4-inches or less.

3.5 STRUTS AND STRUT CLAMPS

   A. Install per manufacturer’s listed orientation.

3.6 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.

C. Do not attach sway bracing to bottom of truss members.

3.7 PIPE VALVE AND FIRE PROTECTION EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate or corrosion resistant metal sign or plastic equipment marker, secured with corrosion-resistant chain or permanent adhesive on or near each Item of fire suppression equipment and each operational device, as specified in this specification if not otherwise specified for each Item or device. Provide signs for the following general categories of equipment and operational devices: Valves, drains, pumps, standpipes, tanks and similar equipment. Provide valve tag on every valve and control device in each piping system. Exclude check valves and valves within factory fabricated equipment units. List each tagged valve in valve schedule for each piping system.

B. Each new piece of equipment to bear a permanently attached identification plate, listing manufacturer's name, capacities, sizes and characteristics.

C. Piping to bear the manufacturer's name, schedule of thickness, size and ASTM identification number.

D. Provide valve tag on every valve and control device in each piping system. Exclude check valves and valves within factory fabricated equipment units. List each tagged valve in valve schedule for each piping system.

E. Drain, Auxiliary Drain and Drum Drips: Provide valve tag on every valve in each fire suppression system. List each tagged valve and its location in valve schedule, identify on fire suppression drawings.

F. Install framed, glass or rigid transparent plastic covered, mounted valve schedule and valve location drawing in main riser or fire pump room.

G. Provide identification sign on ceiling tile below valve location.

H. Provide permanent identification sign at pressure regulating valves stating required setting of pressure regulator.

I. Adjusting: Relocate fire suppression identification device which has become visually blocked.

J. Cleaning: Clean face of identification devices and glass frames of valve charts.

3.8 SIGNS

A. General Information Signs: Provide a general information sign used to determine system design basis and information relevant to the inspection, testing and maintenance requirements required by NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems. Such general information is to be provided with a
permanently marked weatherproof metal or rigid plastic sign, secured with corrosion-resistant wire, chain, or other acceptable means. Such signs are to be placed at each system control rise loop and auxiliary system control valve. The sign is to include the following information:

1. Name and Location of the Facility Protected
2. Presence of High-Piled and/or Rack Storage
3. Maximum Height of Storage Planned
4. Aisle Width Planned
5. Commodity Classification
6. Encapsulation of Pallet Loads
7. Presence of Solid Shelving
8. Flow Test Data
9. Presence of Flammable/Combustible Liquids
11. Presence of Other Special Storage
12. Location of Auxiliary Drains and Low Point Drains
13. Original Results of Main Drain Flow Test
14. Name of Installing Contractor or Designer
15. Indication of presence and location of other auxiliary systems.

B. Dry Signs: At system riser supplying dry systems, provide the following information: volume in gallons contained in each system.

3.9 DRAINS

A. Locate drain connections within 7-feet of floor. Provide piping capable of being fully drained.

B. Provide a drain vent at top of vertical drains. Coordinate with Division 22, Plumbing.

C. Coordinate location of auxiliary drains with Architect. Architect to approve location before drain is installed.

D. Protect drains from tampering and accidental operation.
E. Protect drain discharge at the exterior with a turned-down 45 degree elbow.

END OF SECTION
SECTION 21 13 00
FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Sprinklers.

B. This is a contractor designed system. Contact AHJ prior to bid to verify fire system requirements. Provide design compliant with codes as interpreted by AHJ.

C. Scope: Revision and extension of existing system in new and remodeled areas. Demolish existing piping in back stage under mezzanine storage areas. Replace demolished piping with new fire sprinkler mains and branchlines under the new mezzanines. Provide hangers and bracing as required by NFPA 13. Provide calculation of revised sprinkler system.

D. Coordinate location and type of tamper, flow and pressure switches and fire alarm 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. Division 22, Plumbing
   2. Division 23, Heating, Ventilating and Air-Conditioning
   3. Division 26, Electrical
   4. Section 21 00 00, Fire Suppression Basic Requirements
   5. 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 this specification and AHJ requirements differ from Code.

B. Design Parameters:

   a. Occupancy Classification: Light.
   b. Inside Hose Allowance: 0 GPM.
   c. Outside Hose Allowance: 100 GPM.

2. Building Area: Stage Storage and Stage.
   a. Occupancy Classification: Ordinary Group 2.
   b. Inside Hose Allowance: 0 GPM.
   c. Outside Hose Allowance: 250 GPM.

3. Design parameters above are NFPA 13 minimums. Provide increased design densities, design areas and hose allowances to meet requirements of AHJ.

C. Sprinkler system design to include a 10 percent pressure and flow cushion between system demand point and available water supplies.

D. 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.
1.8 EXTRA STOCK

A. Provide extra sprinklers per code.

B. Provide suitable wrenches for each sprinkler type and metal storage cabinet in riser room.

C. Inside the cabinet, provide a list of sprinklers installed in the property, including sprinkler identification number, manufacturer, model, orifice, deflector type, thermal sensitivity and pressure rating, quantity of each type to be contained in the cabinet and issue or revision date of the list.

1.9 CONTROL VALVES

A. Sprinkler system control valves to be post indicator valves located minimum of 40-feet from building. Main control valve is existing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sprinklers:

1. Finished Areas:
   a. Tyco
   b. Or approved equivalent.

2. Nonfinished Areas:
   a. Tyco
   b. Or approved equivalent.

2.2 SPRINKLERS

A. Finished Areas:

1. Type: Glass-Bulb.

2. Style: Recessed.


5. Escutcheon: Chrome.
B. Nonfinished Areas:
   1. Type: Glass-Bulb.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install per manufacturer's requirements and recommendations.

3.2 SPRINKLERS

A. Center sprinklers in center or quarter points of suspended ceiling tile.

B. Align sprinklers with architectural column lines, lighting, diffusers and other ceiling features. In unfinished ceilings, route piping to minimize visual impact. Sprinklers and piping not so aligned are to be removed and replaced at no additional cost to Owner.

C. Comply with sprinkler layouts as shown in Construction Documents to meet architectural constraints. These may be more conservative than code maximums. Notify architect if layout does not meet Code requirements.

D. Install dry sprinklers in a manner which does not trap water.

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

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. General: 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. FM  FM Global
20. IAPMO  International Association of Plumbing and Mechanical Officials
21. GAMA  Gas Appliance Manufacturers Association
22. HI  Hydraulic Institute Standards
23. ISO  International Organization for Standardization
24. MSS  Manufacturers Standardization Society
25. NEC  National Electric Code
26. NEMA  National Electrical Manufacturers Association
27. NFGC National Fuel Gas Code
28. NFPA National Fire Protection Association
29. NSF National Sanitation Foundation
30. OSHA Occupational Safety and Health Administration
31. SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.
32. UL Underwriters Laboratories Inc.

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. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. 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. **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.

7. **Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.**
8. 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, including resulting charges for work performed under other Divisions, 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.

9. 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.

10. Samples: Provide samples when requested by individual Sections.

11. 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.

12. Operation and Maintenance Manuals, Owners Instructions:

   a. Submit, at one time, 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.

13. 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. Provide products which are UL 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 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. 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 crawlspace 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 Risk 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.

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 and DSA. 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 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 complete work. Complete instruction and demonstration prior to final job site observations.

D. Training and Demonstration per Division 01 specifications for General Commissioning Requirements.

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/metal 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 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 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Valves, General
   2. Balancing Valves
   3. Ball Valves
   4. Swing Check Valves
   5. Wafer Check Valves
   6. Lift Check Valves

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.

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.

B. In addition, meet the following:
   1. NSF 61, Annex G and/or NSF/ANSI 372 for potable water services. Valves must be 3rd party certified.
   2. ISO 9001 Certified.
3. IAPMO Certified for Low Lead.

C. Source Limitations for Valves: Obtain each type of valve from a single source and from a single manufacturer.

D. Model numbers indicated as Basis-of-Design indicate valve characteristics. All valves are to meet code Low Lead/Lead Free Standards.

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. Source Limitations for Valves: Obtain each type of valve from a single source and from a single manufacturer.

B. Valves, General:
   1. Apollo
   2. Armstrong
   3. ASCO
   4. Cla-Val
   5. Conbraco
   6. Crane
   7. Clow
   8. Griswold
   9. Hammond
  10. Hays
  11. Jenkins
  12. Josam
  13. Kennedy
14. Milwaukee
15. Mueller
16. Nibco
17. Red-White Valve
18. Smith
19. Stockham
20. Tour Anderson
21. Wade
22. Watts
23. Wilkins
24. Zurn
25. Or approved equivalent.

C. Balancing Valves:
   1. Griswold
   2. Hays
   3. Armstrong CBV
   4. Tour Anderson
   5. Or approved equivalent.

D. Ball Valves:
   1. See Valves, General above.
   2. NSF Valves:
      a. Clow
      b. Kennedy
      c. Nibco
d. Or approved equivalent.

2.2 VALVES - GENERAL

A. General:

1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.

2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6-inches and smaller. Provide gear operators for quarter-turn valves 8-inches and larger and plug valves installed over 5-feet above finished floor.

3. Valve Identification: Manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

B. Valves in Insulated Piping: With 2-inch stem extension and following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation on valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied.

C. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.

2. Solder Joint: With sockets according to ASME B16.18.

3. Threaded: With thread according to ASME B1.20.1.

D. Valve Bypass and Drain Connections: MSS SP-45.

E. Building Service:

1. Shutoff and Isolation Valves:
   a. Pipe Sizes 3-inches and Smaller: Ball Valve.

2. Drain Service: Ball valves.

3. Strainer Blow-Off: Ball Valve.

4. Check Valves: Swing, Wafer, or Lift.
2.3 BALANCING VALVES

A. Maximum 125 PSIG System Working Water Pressure.

B. Manual Set Balancing Valves:

1. Valves are to be of the "Y" pattern, equal percentage globe-style and provide three functions:
   a. Precise flow measurement.
   b. Precision flow balancing.
   c. Positive drip-tight shut-off.

2. Valve to provide multi-turn, 360 degree adjustment with micrometer type indicators located on the valve handwheel. Valves have a minimum of five full 360 degree handwheel turns. 90 degree circuit-setter style ball valves are not acceptable. Valve handle to have hidden memory feature, which will provide a means for locking the valve position after the system is balanced. Valves to be furnished with precision machined venturi built into the valve body to provide highly accurate flow measurement and flow balancing. The venturi to have two 1/4-inch threaded brass metering ports with check valves and gasketed caps located on the inlet side of the valve. Valves to be furnished with flow smoothing fins downstream of the valve seat and integral to the forged valve body to make the flow more laminar. The valve body, stem and plug to be brass. The handwheel to be high-strength resin.

3. 2-1/2-inch and Larger: Valves are to be of the "Y" pattern, equal percentage globe-style and provide three functions:
   a. Precise flow measurement.
   b. Precision flow balancing.
   c. Positive drip-tight shut off. Valve to provide multi-turn, 360 degree adjustment with micrometer type indicators location on the valve handwheel. Valves to have a minimum of five full 360 degree handwheel turns. 90 degree circuit-setter style ball valves are not acceptable. Valve handle to have hidden memory feature, which will provide a means for locking the valve position after the system is balanced. Valve body to be either cast iron with integrated cast iron flanges (2-1/2-inch to 12-inch) or ductile iron with industrial standard grooved ends (2-1/2-inch to 12-inch). Valve stem and plug disc to be bronze with handwheel that permits multi-turn adjustments. Sizes 2-1/2-inch and 3-inch - five turns, sizes 4-inch to 6-inch - 6 turns, sizes 8-inch to 10-inch - 12 turns and size 12-inch - 14 turns. Flange adapters to be provided to prevent rotation.
2.4 BALL VALVES

A. All ball valves on brazed piping are to be three-piece.

B. 2-1/2-inches and Smaller: MSS SP-110, 400-600 PSI, two-piece full port ball configuration, bronze body, extended soldered ends for copper pipe and threaded ends for iron pipe, brass or stainless steel ball, Teflon seat or brass stem. Apollo 70CLF 100 Series two-piece.

C. 3-inches and Larger: MSS SP-110, 400-600 PSI, three-piece full port ball configuration, bronze body, extended soldered ends for copper pipe and threaded ends for iron pipe, brass or stainless steel ball, Teflon seat or brass stem. Apollo 82-100/82A 140 Series three-piece.

2.5 SWING CHECK VALVES

A. 2-inches and Smaller: Class 125, bronze body, horizontal swing, regrinding type, Y-pattern, renewable disc. Nibco 413. MSS SP-80.

B. 2-1/2-inches and Larger: Class 125, iron body, bolted bonnet, horizontal swing, renewable seat and disc, flanged ends. Nibco F918. MMS SP-71.

C. Rubber Flapper Check Valve: Horizontal or vertical upward flow installation. Working pressure to 175 PSI. Ductile iron or cast iron body. Steel reinforced Buna-N rubber flapper epoxy coating on wetted parts. MSS SP-80.

D. Check Valve: Horizontal installation. Working pressure to 300 PSI, Type 304/302 Stainless Steel conforming to ASTM 167. Ductile body, ASTM A536, and stainless clapper, EPDM, nitrile or optional viton bumper and bonnet seals. Stainless wetted parts.

2.6 WAFER CHECK VALVES

A. 2-inches and larger, Class 125, lead free, cast iron.

B. Disk with renewable bronze disks.

C. Body spring loaded wafer style check valve twin.

D. 200 psi rated maximum temperature 180 Degrees F., ANSI B16d, NSF/ANSSI 61 and 372.

E. Nibco W-920-W-LF.

2.7 LIFT CHECK VALVES


B. 4-inches and Larger: Stainless or bronze body, 125 PSI, spring loaded, silent check, bronze, stainless steel or TFE seat and disc. 125 PSI Valmatic Series 1800.
PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves and weld ends.
   4. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Do not attempt to repair defective valves; replace with new valves.

E. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate Sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

F. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose end adapter and cap on chain for each valve that must be installed with stem below horizontal plane. Ensure installation provides full stem movement.

G. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

H. Mechanical Actuators: Install with chain operators where indicated. Extend chains to 5-feet above floor and hook to clips to clear aisle passage.

I. Stem Selection: Outside screw and yoke stems, except provide inside screw, non-rising stem where space prevents full opening of OS&Y valves.

J. Seats: Renewable seats, except where otherwise indicated.

K. Installation of Check Valves:
1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow. Only install where there are 10 pipe diameters of straight pipe upstream of valve.

2. Lift Check Valves: Install in piping line with stem vertically upward, position for proper direction of flow.

L. Balancing Valves: Install with flow in the direction of the arrow on the valve body and installed at least five pipe diameters downstream from any fitting, and at least ten pipe diameters downstream from any pump. Two pipe diameters downstream from the balancing valve should be free of any fittings. When installed, easy and unobstructed access to the valve handwheel and metering ports for adjustment and measurement are to be provided. Mounting of valve in piping must prevent sediment build-up in metering ports.

M. When soldering, use paste flux that are approved by the manufacturer for use with lead free alloys.

N. If valve applications are not indicated on Drawings, use the following:
   1. Shutoff Service: Ball valves.

O. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

P. Valves, except wafer types, with the following end connections.
   1. For Copper Tubing, 2-inches and Smaller. Threaded ends except where solder-joint valve-end.
   2. For Copper Tubing, 2-1/2-inches to NPS 4-inches. Flanged ends except where threaded valve-end.
   3. For Copper Tubing: 5-inches and Larger: Flanged ends.
   4. For Steel Piping, 2-inches and Smaller: Threaded ends.
   5. For Steel Piping, 2-1/2-inches to NPS 4-inches: Flanged ends except where threaded valve-end.
   6. For Steel Piping, 5-inches and Larger: Flanged ends.

Q. Valve Adjusting and Cleaning:
   1. Inspect valves for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.
2. Valve Identification. Tag valves per Section 22 05 53, Identification for Plumbing Piping and Equipment.

3.2 BALANCING VALVES

A. See General Installation Requirements above.

B. Install per manufacturer recommendations.

C. Purge and clean all piping to be connected to valve.

D. Inspect the shipping container before unpacking to look for damage that could have occurred during reported to the transportation company immediately. After you have this visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly of valve body.

E. Make sure to note the valves model number during the unpacking process. The model number will need to be provided when purchasing replacements parts.

F. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.

3.3 BALL VALVES

A. See General Installation Requirements above.

B. Install per manufacturer recommendations.

C. Purge and clean all piping to be connected to valve.

D. Inspect the shipping container before unpacking to look for damage that could have occurred during reported to the transportation company immediately. After you have this visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly of valve body.

E. Make sure to note the valves model number during the unpacking process. The model number will need to be provided when purchasing replacements parts.

F. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.
3.4 SWING CHECK VALVES

A. See General Installation Requirements above.
B. Install per manufacturer recommendations.
C. Purge and clean all piping to be connected to valve.
D. Inspect the shipping container before unpacking to look for damage that could have occurred during reported to the transportation company immediately. After you have this visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly of valve body.
E. Make sure to note the valves model number during the unpacking process. The model number will need to be provided when purchasing replacements parts.
F. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.
G. Ejector and Sump Pump-Discharge Check Valves:
   1. 2-inches and Smaller: Bronze swing or spring-loaded lift check valves with bronze disc.
   2. 2-1/2-inches and Larger: Rubber flapper swing check valves with lever and weight.
H. Domestic Water and Circulation Pump Discharge Check Valves:
   1. 2-inches and Smaller: Bronze body, spring loaded, lead free, lift check.
   2. 2-1/2-inches and Larger: Wafer style, silent lift check valve, lead free.

3.5 WAFER CHECK VALVES

A. See General Installation Requirements above.
B. Install per manufacturer recommendations.
C. Purge and clean all piping to be connected to valve.
D. Inspect the shipping container before unpacking to look for damage that could have occurred during reported to the transportation company immediately. After you have this visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly of valve body.
E. Make sure to note the valves model number during the unpacking process. The model number will need to be provided when purchasing replacements parts.

F. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.

G. Domestic Water and Circulation Pump Discharge Check Valves:
   1. 2-1/2-inches and Larger: Wafer style, silent lift check valve, lead free.

3.6 LIFT CHECK VALVES

A. See General Installation Requirements above.

B. Install per manufacturer recommendations.

C. Purge and clean all piping to be connected to valve.

D. Inspect the shipping container before unpacking to look for damage that could have occurred during reported to the transportation company immediately. After you have this visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly of valve body.

E. Make sure to note the valves model number during the unpacking process. The model number will need to be provided when purchasing replacements parts.

F. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.

G. Ejector and Sump Pump-Discharge Check Valves:
   1. 2-inches and Smaller: Bronze swing or spring-loaded lift check valves with bronze disc.
   2. 2-1/2-inches and Larger: Rubber flapper swing check valves with lever and weight.

H. Domestic Water and Circulation Pump Discharge Check Valves:
   1. 2-inches and Smaller: Bronze body, spring loaded, lead free, lift check.
   2. 2-1/2-inches and Larger: Wafer style, silent lift check valve, lead free.

END OF SECTION
SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY
A. Work Included:
   1. Pipe Hangers and Supports for Plumbing Piping and Equipment
   2. Wall and Floor Sleeves
   3. Building Attachments
   4. Flashing
   5. Miscellaneous Metal & Materials

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:
   2. Hanger spacing installation and attachment to meet all manufacturers requirements and MSS SP-58.
   3. Terminology: As defined in MSS SP-90 "Guidelines on Terminology for Pipe Hangers and Supports".
   4. Install piping per SMACNA's requirements.

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.

B. In addition, meet the following:

1. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. 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.

3. Support systems to be supplied by a single manufacturer.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

1.7 PERFORMANCE REQUIREMENTS

A. General - Provide pipe 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 are not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Support Systems:

1. Support frames such as pipe racks or stanchions for piping 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 piping to support multiple pipes capable of supporting the 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 the combined weight of supported systems, system contents and test water.

E. Provide seismic restraint hangers and supports for piping and equipment.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Pipe Hangers and Supports for Plumbing Piping and Equipment:

1. Pipe Hangers/Supports:
   a. B-Line Systems, Inc.
   b. Anvil International
   c. HOLDRITE
   d. Erico Co., Inc.
   e. Rilco Manufacturing Co. Inc.
   f. Nelson-Olson Inc.
   g. Or approved equivalent.

2. Channel Support Systems:
   a. B-Line Systems, Inc.
   b. Anvil International, Anvit-Strut
   c. Erico Hanger Co., Inc.; O-Strut Div.
   d. Unistrut Corp.
   e. HOLDRITE EZ-Strut Systems
   f. Or approved equivalent.

3. Thermal-Hanger Shield Inserts:
   a. Erico Hanger Co., Inc.
   b. Pipe Shields, Inc.
   c. Rilco Manufacturing Co., Inc.
   d. HOLDRITE Insulation Couplings
   e. Or approved equivalent.
4. Freestanding Roof Supports:
   a. Erico Hanger Co., Inc.
   b. Nelson-Olsen Inc.
   c. B-Line
   d. M. Fab
   e. Or approved equivalent.

5. Pipe Alignment and Secondary Supports:
   a. HOLDRITE
   b. Starquick
   c. Or approved equivalent.

B. Wall and Floor Sleeves:
   1. Below Grade and High Water Table Areas:
      a. Modular Link Sealing System at Pipe Sleeves:
         1) Thunderline Corporation
         2) Or approved equivalent.
   2. Pre-Engineered Firestop Pipe Penetration Systems:
      a. HOLDRITE HydroFlame
      b. Proset
      c. Or approved equivalent.

C. Building Attachments:
   1. Anchor-It
   2. Gunnebo Fastening Corp.
   3. ITW Ramset/Red Head
5. Or approved equivalent.

D. Flashing:
   1. Fastenal
   2. Or approved equivalent.

E. Miscellaneous Metal & Materials:
   1. See Miscellaneous Metal & Materials article below.
   2. Powder-Actuated Fastener Systems:
      a. Gunnebo Fastening Corp.
      b. Hilti, Inc.
      c. ITW Ramset/Red Head.
      d. Masterset Fastening Systems, Inc.
      e. Or approved equivalent.

2.2 PIPE HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

A. Horizontal Piping Hangers and Supports - Horizontal and Vertical Piping, and Hanger Rod Attachments:
   1. Factory fabricated horizontal piping hangers and supports to suit piping systems in accordance 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.
   5. Provide padded pipe hangers, clamps and supports for thermoplastic piping system.
   6. Install no hub cast iron pipe and fittings per CISPI 301-09 Installation Procedures for Hubless Cast Iron Pipe and Fittings for Sanitary and Storm Drain Waste and Vent Piping Applications. Brace hubless cast iron pipe and fittings 5-inch and larger with HOLDRITE No Hub Pipe Restraints or approved equivalent.

B. Pipe Hangers, Guides and Channel Systems:
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 MSS.

2. **Hanger Rod Couplings**: 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, MSS SP Type 6 or Type 10, or approved equivalent. Pipe sizes 2-1/2-inches and larger, clevis type hangers with adjustable nuts on rod. MSS SP Type 1. Pipe rings to have same finish as hanger rods.

**C. Thermal-Hanger Shield Inserts**: 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.

2. **Material for Hot Piping**: Water-repellent-treated ASTM C533, Type 1 calcium silicate.

3. **For Trapeze or Clamped System**: Insert and shield cover entire circumference of pipe.

4. **For Clevis or Band Hanger**: Insert and shield to cover lower 180 degrees of pipe.

5. **Insert Length**: Extend 2-inches beyond sheet metal shield for piping operating below ambient air temperature.

6. **Thermal Hanger Shield Inserts** should be provided at the hanger points and guide locations on pipes requiring insulation. The Inserts should consist of Polyisocyanurate (urethane or phenolic insulation) encircling the entire circumference of the pipe with a 360 degree PVC (1.524 mm thick) with a living hinge and J lock and installed during the installation of the piping system.

**D. Concrete Inserts**:

1. **Malleable iron body, hot dipped galvanized finish. Lateral adjustment. MSS Type 18.**

**E. Continuous Concrete Insert**:

1. **Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.**

**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:

1. Pipe Hangers: Adjustable Clevis type, Federal Specification WW-H-171 (Type 1), UL listed, stainless steel Type 316. MSS Type 1. If PVC piping to be used, provide Type 1 hanger, coated for PVC piping.

2. Rod: 5/8-inch stainless steel Type 316.

3. Eyebolt: Stainless steel Type 316.

4. Nuts and Washers: Stainless steel Type 316.

H. Hangers for Pipe Size 2-inches and Smaller:

1. Adjustable swivel ring hanger, UL listed, Type 6 or Type 10.

I. Hangers for Pipe Size 2-1/2-inches and Larger:

1. Adjustable clevis type, UL listed, Type 1.

J. Riser Clamps:

1. Steel, UL listed. MSS Type 8.

K. Plumbers Tape:

1. Not permitted as pipe hangers or pipe straps.

L. Pipe Alignment and Secondary Support Systems:

1. Secondary Pipe supports for general applications (Non-Acoustical).
   a. Supports will be manufactured in compliance with IAPMO Product Standard PS 42-96. All products provided will be listed by IAPMO for secondary pipe support.
   b. Supports may be used when sound and/or vibration transfer is not a concern.

2. Secondary pipe supports for sound and vibration attenuation (Acoustical).
   a. Supports will be manufactured in compliance with IAPMO Product Standard PS 42-96. All products provided will be listed by IAPMO for secondary pipe support.
   b. Acoustical pipe supports will be manufactured and installed in compliance with International Organization for Standardization (ISO) 3822-1 with current amendments.
c. Supports will be used when sound and/or vibration transfer is a concern. Locations where acoustical supports will be provided and include but are not limited to partition walls between living units, tenant spaces, retail units, mechanical rooms and lobbies.

d. Support Products:

1) Support to Wall Brace and Wall Stud Penetrations: HOLDRITE #261, #262, #263, and #264, or approved equivalent.

2) Pipe Wrap for Pipe Clamps and Channel-Mounted Pipe Clamps: HOLDRITE #270, or approved equivalent.

3) Pipe Wrap for Pipe Hangers: HOLDRITE #271, #272-2, and #272-4, or approved equivalent.

4) Drop-Ear Fitting Support: HOLDRITE #265, or approved equivalent.

5) Floor Riser Isolation Pads: HOLDRITE #275-T, or approved equivalent.

6) Floor Isolation Pads (General Applications): HOLDRITE #274, #275, #276, and #278, or approved equivalent.

M. Freestanding Roof Pipe Supports:

1. Polyethylene high-density U.V. 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 block type supports.

2.3 WALL AND FLOOR SLEEVES

A. Below Grade and High Water Table Areas:

1. Modular Link Sealing System at Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal. Use a modular link sealing system at sleeves to continuously fill the annular space between the pipe and the wall opening. Provide Link-seal Type C unless otherwise noted. OS with S-316 stainless construction for continuous water/tank walls.

2. Sleeves through concrete foundation walls and floors. Ductile iron pipe. Class 50 or 51 pipe conforming to ANSI/AWWA C151/A21.51, cement lined. Pipe sleeve will extend a minimum of 6-inches beyond outside perimeter of foundation. Final placement of sleeve will be confirmed with project's structural engineer. In areas with a high water table, provide AWWA C900, Class 235 plastic pipe in lieu of ductile iron pipe.
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. Insulating Caulking: Eagle or Pitcher Super 66 high temperature cement.

D. 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 following minimum gauges for sizes indicated:
   a. Sleeve Size 4-inches in Diameter and Smaller: 18 gauge.
   b. Sleeve Sizes 5-inches to 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 lbs./cu.ft. 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.

2.4 BUILDING ATTACHMENTS

A. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project Structural Engineer. Provide anchor bolts suitable for cracked concrete.

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.

C. Building Attachments:

1. Beam Clamps:
   a. MSS Type 19 and 23, wide throat, with retaining clip.
   b. Universal Side Beam Clamp: MSS Type 20.

2. Anchor Bolts:
   a. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer. Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
   b. 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.
   c. 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.

3. Building Attachments:
   a. Factory fabricated attachments to suit building substructure conditions and in accordance with manufacturer's published product information.
   b. Select size of building attachments to suit hanger rods.

4. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

5. Grout: ASTM C1107, Grade B, factory mixed and packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
   a. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
   c. Design Mix: 5000-PSI (34.5-MPa), 28-day compressive strength.
2.5 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.

D. Provide galvanized components for items exposed to weather.

2.6 MISCELLANEOUS METAL AND MATERIALS

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.

H. Use straps, threshold rods and wire with sizes required by SMACNA to support ductwork.

I. 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.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Examination:

1. Verify building materials to have hangers and attachments affixed in accordance with hangers to be used. Provide supporting calculations.

B. Preparation:

1. 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.

C. Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate with project structural engineer proper placement of inserts, anchors and other building structural attachments.

3.2 PIPE HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

A. Hangers and Supports:

1. Comply with MSS SP-58. Pipe Hanger and Support Installation: 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. Steel Backing in Walls: Provide steel backing in walls to support fixtures and piping hung from steel stud walls.

3. 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.

4. 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

5. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers.

6. 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.

7. Do not support piping from other piping.

8. Fire protection piping will be supported independently of other piping.

9. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

10. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

11. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchor, and to facilitate the action of expansion joints, expansion loops, expansion bends and similar units.

12. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

13. 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.

14. 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 a 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 having a 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 DN 90): 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.

15. Equipment Clearances: Do not route ductwork, equipment, or piping through electrical rooms, transformer vaults, 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 piping or equipment 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.

16. Pipe supports and hanger spacing (pipe supported from structure or floor-supported) to meet the requirements of References and Standards Article in Part 1 above.

17. 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 with in 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.

B. 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. At roofing applications, the adhesion mastic is to be specifically submitted to and approved by the roofing system manufacturer/installer to maintain the integrity of all warranties.

4. At concrete floors, install a polyurethane mastic to the support block and adhere in place.

C. 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. Provide neoprene pads for all systems except natural gas.

3. Riser to be supported at each floor penetration.

4. Provide structural steel supports at the base of pipe risers. Size supports to carry forces exerted by piping system when in operation.

D. Adjusting and Painting:

1. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping and equipment to proper level and elevations.

2. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted.

3.3 WALL AND FLOOR SLEEVES

A. "Link-Seal" Pipe Sleeves: Install at slab on grade floor/below grade piping penetrations. Provide manufacturer's sleeve appropriate to seal type for pre-cast penetrations (except for
DWV piping at slab on grade). Provide manufacturer's sleeve appropriate to seal type for pre-cast penetrations.

B. 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 requirement, 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 and fire rated per ASTM 814.

3.4 BUILDING ATTACHMENTS

A. 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.

B. 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.

C. Building Attachments:

1. Install within concrete or on structural steel or wood. Attachment to Wood Structure: Provide MSS Type 34 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.

D. 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.

E. 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 wall, and through equipment room walls and floors.

F. 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 sealant.

G. 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. Use HOLDRITE HydroFlame or approved equivalent.

H. Install building attachments within concrete slabs or attach to structural steel. 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.

I. 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.

J. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer’s written instructions.
K. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

3.5 FLASHING

A. Flash and counterflash where piping passes through weather or waterproofed walls, floors and roofs.

B. Flash vent soil pipes with flashings per Division 01, General Requirements.

C. Flash floor drains over finished areas and roof drains, 10-inches clear on sides, minimum 36-inches x 36-inches sheet size. See Division 01, General Requirements. Fasten flashing to drain with clamping device.

D. Install built up fixtures (mop sinks, shower stalls, shower floors) with water sealing systems/membranes to meet Code and as prescribed by Division 01, General Requirements and Section 22 00 00, Plumbing Basic Requirements. Meet all Code testing requirements. Provide drainage devices with appropriate flanges, clamps, etc. to meet these installation requirements and ensure a water-tight installation.

3.6 MISCELLANEOUS METAL AND MATERIALS

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.

F. Fabrication:

1. 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 dip 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.

2. Finishes:

a. 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 with primer of same material before installation. Apply zinc coatings and paint primers uniformly and smoothly; leave ready for finish painting as specified elsewhere.

b. Metal in contact with Concrete, Masonry and Other Dissimilar Materials:

1) 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.

c. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.
G. Metal Fabrication:

1. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

2. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

3. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of weld and methods used in correcting welding work, and with the following:
   
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   
   b. Obtain fusion without undercut or overlap.
   
   c. Remove welding flux immediately.
   
   d. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

4. Provide galvanized components for items exposed to weather.

END OF SECTION
SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Plastic Nameplates
2. Tags
3. Plastic Pipe Markers

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.

1.4 SUBMITTALS

A. Submittals as required by Section 22 00 00, Plumbing Basic Requirements and Division 01. General Requirements.

B. In addition, provide:

1. Schedules:
   a. Submit valve schedule for each piping system, in tabular format using Microsoft Word or Excel software. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses by special "flags" in margin of schedule. In addition to mounted copies, furnish extra copies for maintenance manuals.
   b. Provide Schedules organized as follows:
      1) Equipment Type:
         a) Identification:
b) Background:
   (1) Size:
   (2) Color:

c) Lettering:
   (1) Size:
   (2) Color:

c. For renovations or expansions of existing systems, coordinate with Owner and develop valve schedule on existing schedule naming and format.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 22 00 00, Plumbing 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 22 00 00, Plumbing 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 22, Plumbing Sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Plastic Nameplates:

   1. Brady Corporation

   2. Or approved equivalent.

C. Tags:

   1. Brady Corporation
2. Brimer
3. Champion America Inc.
4. Craftmark
5. Seton Identification Products
6. Or approved equivalent.

D. Plastic Pipe Markers:
1. Brady Corporation
2. Brimer
3. Champion America Inc.
4. Craftmark
5. Seton Identification Products
6. Or approved equivalent.

2.2 PLASTIC NAMEPLATES

A. Description: Engraving stock melamine 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 one-eighth-inch thick material.

2. Letter Height: 1/2 inch.
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.
2.3 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2-inch diameter.

B. Metal Tags: Polished Brass with stamped letters; tag size minimum 1-1/2-inch diameter with smooth edges.

C. Valve designations to be coordinated with existing valve identifications to ensure no repetitive designations are utilized.

D. Chart/Schedules: Valve Schedule Frames. For each page of a valve schedule, provide glazed display frame with removable mounting as appropriate for wall construction upon which frame is to be mounted. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

E. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

F. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
   1. Size: Approximately 4 by 7-inches.
   2. Fasteners: Brass grommet and wire.
   3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

2.4 PLASTIC PIPE MARKERS


B. Plastic Pipe Markers (for external diameters of 6-inches and larger including insulation): Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers (for external diameters less than 6-inches including insulation): Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Minimum information indicating flow direction arrow and identification of fluid being conveyed.
PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Lettering and Graphics:
   1. General: Coordinate names, abbreviations and other designations used in plumbing identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.

   2. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Chiller No. 3, Air Handling Unit No. 42, Standpipe F12, and the like).

B. Preparation:
   1. Degrease and clean surfaces to receive adhesive for identification materials.

C. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

D. Install valve schedule at each mechanical room.

3.2 PLASTIC NAMEPLATES

A. Install plastic nameplates with corrosive-resistant mechanical fasteners.

B. Access Doors: Provide markers or stenciled signs on each access door and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions.

3.3 TAGS

A. Coordinate with the facility maintenance personnel to insure consistency with the existing tagging system.

B. Tag balancing valves with balanced GPM or CFM indicated after balancing is completed and accepted.

C. Install tags with corrosion resistant chain.
D. Identify pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates riveted to equipment body. Small devices, such as in-line pumps, may be identified with tags.

E. Identify control panels and major control components outside panels with plastic nameplates riveted to equipment body.

F. Identify valves in main and branch piping with metal tags. Indicate valve function and the normally open or closed positions on the valve tag.

3.4 PLASTIC PIPE MARKERS

A. Install plastic pipe markers in accordance with manufacturer's instructions.

B. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

C. For exterior underground piping installations, Install underground plastic pipe markers with tracer wire 6 to 8-inches below finished grade directly above buried pipe.

D. Identify piping, concealed or exposed, with plastic tape pipe markers. Use metal tags on piping 3/4-inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20-feet (reduced to 10-feet in congested areas and mechanical equipment rooms) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction. Locate near branches, valves, control devices, equipment connections, access doors, floor/wall penetrations.

E. Access Doors: Provide markers or stenciled signs on each access door and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions.

END OF SECTION
SECTION 22 05 93

TESTING, ADJUSTING, AND BALANCING FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Balancing water flow within distribution systems of all Division 22, Plumbing Sections, including sub-mains, branches, and terminals, to indicated quantities according to specified tolerances.

2. Adjusting Plumbing systems to provide indicated quantities.

3. Verifying that automatic control devices are functioning properly.

4. Reporting results of the activities and procedures specified in this Section.

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.

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.

B. In addition, meet the following:

1. Acceptable Balance Firm:

   a. General:
1) Procure services of independent balance and testing agency which specializes in balancing and testing of plumbing systems, to balance, adjust and test water circulating. Minimum Experience: 5 years.

b. Industry Standards: Testing and Balancing will conform to NEBB, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and American National Standards Institute (ANSI) as follows:


2) ASHRAE: Comply with recommendations pertaining to measurements, instruments, and testing, adjusting and balancing.

c. Test Observation: If requested, conduct tests in the presence of the Architect or the Architect's representative.

2. Provide proof of testing agency having successfully completed at least five projects of similar size and scope.

3. Code Compliance: Perform tests in the presence of the Authority Having Jurisdiction (AHJ) where required by the Authority Having Jurisdiction (AHJ).

4. Owner Witness: Perform tests in the presence of the Owner's representative.

5. Engineer Witness: The engineer or engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.

6. Simultaneous Testing: Test observations by the Authority Having Jurisdiction (AHJ), the Owner's representative and the engineer's representative need not occur simultaneously.

7. Do not perform testing, adjusting, and balancing work until plumbing equipment has been completely installed and is operating continuously as required.

8. Conduct testing and balancing with clean filters in place. Clean strainers prior to performing testing and balancing.

9. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB.

10. Testing, Adjusting, and Balancing Conference: Meet with the Owner's and the Architect's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, controls Installer, and other support personnel. Provide 7 days advance notice of scheduled meeting time and location.
a. Agenda Items: Include at least the following:

1) Submittal distribution requirements.
2) Testing, adjusting, and balancing plan.
3) Work schedule and Project site access requirements.
4) Coordination and cooperation of trades and subcontractors.
5) Coordination of documentation and communication flow.

11. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:

a. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.

b. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.


14. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.

15. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

16. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

1.7 DEFINITIONS

A. Adjust: To regulate fluid flow rate at the equipment.
B. Balance: To proportion flows within the distribution system, including sub mains, branches, and terminals, according to design quantities.

C. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

D. Report Forms: Test data sheets for recording test data in logical order.

E. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

F. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

G. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

H. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

I. TAB: Testing and Balancing.

J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

K. Test: A procedure to determine quantitative performance of a system or equipment.

L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.


O. CTI: Cooling Tower Institute.

P. NEBB: National Environmental Balancing Bureau.

Q. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.8 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, controls installers, and other mechanics to operate systems and equipment to support and assist testing, adjusting, and balancing activities.
B. Notice: Provide 7 days advance notice for each test. Include scheduled test dates and times.

C. Perform testing, adjusting, and balancing after leakage and pressure tests on piping distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

B. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

C. Non-Owner Occupancy: Complete balancing of building systems prior to Substantial Completion and owner occupancy.

3.2 EXAMINATION

A. Examine Contract Documents to become familiar with project requirements and existing building record documents (if available) to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.

1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.

2. Verify that balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of Plumbing systems and equipment.

C. Examine equipment performance data including pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

D. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
E. Examine system and equipment installations to verify that indicated balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

F. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

G. Examine open-piping-system pumps to ensure absence of entrained air in the suction piping.

H. Examine equipment for installation and for properly operating safety interlocks and controls.

I. Examine automatic temperature system components to verify the following:
   1. Valves, and other controlled devices operate by the intended controller.
   2. Valves are in the position indicated by the controller.
   3. Integrity of valves for free and full operation and for tightness of fully closed and fully open positions.
   4. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.
   5. Sensors are located to sense only the intended conditions.
   6. Sequence of operation for control modes is according to the Contract Documents.
   7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.

J. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

K. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:
   1. Permanent electrical power wiring is complete.
   2. Systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.

4. Isolating and balancing valves are open and control valves are operational.

C. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   1. Attendance is required by installers whose work will be tested, adjusted, or balanced.

D. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.4 GENERAL TESTING AND BALANCING PROCEDURES

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

B. Cut insulation for pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including control positions, valve indicators and similar controls and devices, to show final settings.

3.5 ADJUSTMENT TOLERANCES

A. Piping Systems: Adjust to within plus or minus 10 percent of design.

3.6 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves and other adjustment devices allowing settings to be restored. Set and lock memory stops.
D. Mark on drawings locations where other critical measurements were taken and cross reference location in final report.

3.7 FUNDAMENTAL PROCEDURES FOR PIPING SYSTEMS

A. Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 10 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
   1. Open manual valves for maximum flow.
   2. Check expansion tank liquid level, or air charge if bladder type.
   3. Check makeup-water-station pressure gauge for adequate pressure.
   4. Check flow-control valves for specified sequence of operation and set at design flow.
   5. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.

3.8 FINAL REPORT

A. General: Computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into Sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
   1. Include a list of the instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to the certified field report data, include the following:
   1. Pump curves.
   2. Field test reports prepared by system and equipment installers.
   3. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
1. Title page.

2. Name and address of testing, adjusting, and balancing Agent.

3. Project name.

4. Project location.

5. Architect's name and address.

6. Engineer's name and address.

7. Contractor's name and address.


9. Signature of testing, adjusting, and balancing Agent who certifies the report.

10. Summary of contents, including the following:
   a. Design versus final performance.
   b. Notable characteristics of systems.
   c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.

12. Notes to explain why certain final data in the body of reports vary from design values.

E. Pump Test Reports: For pumps, include the following data. Calculate impeller size by plotting the shutoff head on pump curves.

1. Unit Data: Include the following:
   a. Unit identification.
   b. Location.
   c. Service.
   d. Make and size.
   e. Model and serial numbers.
   f. Water flow rate in gpm (L/s).
g. Water pressure differential in feet of head or PSIG (kPa).
h. Required net positive suction head in feet of head or PSIG (kPa).
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.

END OF SECTION
SECTION 22 07 00
PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Type 1, Fiberglass Pipe Insulation
   2. Type 2, Flexible Elastomeric Insulation
   3. Type 7, ADA Accessible Lavatory/Sink Insulation Kit

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. Piping 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 22 00 00, Plumbing 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 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements apply to this Section.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

1.7 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of composite insulation construction as installed to be not more than a flame spread of 25, fuel contribution of 50 and smoke development of 50 as tested by ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with requirements of UL "Pipe and Equipment Coverings".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General:

1. Armacell LLC Armaflex
2. Certainteed
3. Johns Manville
4. Knauf
5. Owens-Corning
6. PPG
7. Or approved equivalent.

B. Type 1, Fiberglass Pipe Insulation:

1. Owens-Corning
2. Johns Manville

3. Or approved equivalent.

C. **Type 2, Flexible Elastomeric Insulation:**

1. **Glue:**
   a. Armacell LLC Armadex Low VOC Adhesive
   b. Halstead
   c. Or approved equivalent.

2. **Paint:**
   a. Armacell LLC Armadex
   b. Halstead
   c. Or approved equivalent.

D. **Type 7, ADA Accessible Lavatory/Sink Insulation Kit:**

1. IPS/Truebro

2. McGuire/Pro-Wrap

3. Plumberex/Pro-Extreme

4. Brocar Trap Wrap

5. Or approved equivalent.

2.2 **TYPE 1, FIBERGLASS PIPE INSULATION**

A. Glass Fiber: ASTM C547; rigid molded, noncombustible.

1. **Thermal Conductivity Value:** 0.27 BTU*in/(hr*sf*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, with self sealing longitudinal laps and butt strips or vapor barrier mastic.
2.3 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 (3/4-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.

C. Paint: Nonhardening high elasticity type, specifically manufactured as a protective covering of flexible elastomeric foam insulation for prevention of degradation due to exposure to sunlight and weather.

2.4 TYPE 7, ADA ACCESSIBLE LAVATORY/SINK INSULATION KIT

A. P-traps, trap arms, tail pieces, hot water and cold water insulating guards. Molded closed cell insulation with vinyl cover and nylon fasteners, paintable. Thermal conductivity; \( K = 1.17 \) (BTU*in/(hr*sf*F) at 75 degrees F mean temperature. Provide accessories as required for complete installation covering all exposed waste piping, water piping, stops and supplies. Color white.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION INFORMATION

A. Verification of Conditions:
   1. Do not apply insulation until pressure testing of piping has been completed and system tested. Do not apply insulation until piping has been inspected.
   2. Examine areas and conditions under which insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Preparation:
   1. Clean and dry surfaces to be insulated.

C. Installation:
1. **Insulation:** Continuous through walls, floors and partitions except where noted otherwise.

2. **Piping and Equipment:**

   a. 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.

   b. Cover insulation on pipes above ground, outside of building, with aluminum jacketing. Position seam on bottom of pipe.

D. **Protection and Replacement:**

   1. Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

E. **Labeling and Marking:**

   1. Provide labels, arrows and color coding on piping. Attach labels and flow direction arrows to jacketing per Section 22 05 53, Identification for Plumbing Piping and Equipment.

F. **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>Hot Water Piping Above Grade</td>
<td>1</td>
<td>Runouts up to 2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mains=&lt;2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mains &gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td>Hot Water Circulation Piping Above Grade</td>
<td>1</td>
<td>Runouts, up to 2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mains =&lt;2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mains &gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>
### Domestic Cold Water Piping Above Grade

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1/2-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td>1-inch</td>
</tr>
</tbody>
</table>

### Hot Water Piping Below Grade

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>

### Hot Water Circulation Piping Below Grade

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>

### Domestic Water Piping Exposed to Weather

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1-1/2-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td></td>
</tr>
</tbody>
</table>

### Piping with Heat Tracing

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>

### Rain Conductors all Above Grade Piping

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1/2-inch</td>
</tr>
</tbody>
</table>

### ADA Accessible Lavatory/Sink

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>As Listed</td>
</tr>
</tbody>
</table>

### Condensate Drain Piping

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1/2-inch</td>
</tr>
</tbody>
</table>

### Aboveground Refrigerated Water Systems

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1-inch</td>
</tr>
</tbody>
</table>

### Solar Hot Water and Glycol Piping

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2-inch</td>
<td>1-inch</td>
</tr>
<tr>
<td>&gt;2-inch</td>
<td>1-1/2-inch</td>
</tr>
</tbody>
</table>

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### 3.2 TYPE 1, FIBERGLASS PIPE INSULATION

A. See General Installation Requirements above.

B. Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.

C. 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 preformed PVC molded insulation covers.

D. Roof Drain/Overflow Drain Underbodies and Piping: Above grade, cover horizontal roof drain piping and overflow drain piping with sectional pipe covering. Cover underside of drain body with fiberglass insulation; attached with adhesive and supported externally with 26 gauge galvanized flat strapping anchored to structure.

E. Insulation Shields: 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 (hot and cold piping).

F. Install in accordance with manufacturer's instructions for below grade installation.

3.3 TYPE 2, FLEXIBLE ELASTOMERIC INSULATION

A. See General Installation Requirements above.

B. 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 undercover with two coats of finish as recommended by manufacturer.

C. Roof Drain/Overflow Drain Underbodies and Piping: Above grade, cover horizontal roof drain piping and overflow drain piping with sectional pipe covering. Cover underside of drain body with fiberglass insulation; attached with adhesive and supported externally with 26 gauge galvanized flat strapping anchored to structure.

D. Flexible Elastomeric Tubing: Slip insulation over piping or if piping is already installed, it should be slit and snapped over piping. Joints and butt ends must be adhered with S20 adhesive.

E. Insulation Shields: 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 (hot and cold piping).

F. Install in accordance with manufacturer's instructions for below grade installation.

3.4 TYPE 7, ADA ACCESSIBLE LAVATORY/SINK INSULATION KIT

A. See General Installation Requirements above.

B. Install in accordance with manufacturers instructions.

C. Provide lavatory/sink insulation kit. Install on waste fittings, hot and cold water stops and supplies.
SECTION 22 10 00

PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Sanitary, Drainage (Rain/Stormwater) DWV Piping, Buried Within 5-feet of Building
   2. Sanitary, Drainage (Rain/Stormwater) DWV Piping, Above Grade
   3. Pump Waste Pressure Piping (Pumped Discharge)
   4. Water Piping, Buried Within 5-feet of Building
   5. Hot and Cold Domestic Water Above Grade
   6. Condensate Piping
   7. Primer Piping

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, Annex G.
   2. Steel pipe to conform to ASTM and ANSI Standards as specified in this Section.
   3. Copper piping to conform to ASTM B88, B306 and B208 and the standards of Copper Development Association (CDA), and American Welding Society, (AWS).
   5. Manufacturer’s Standards Society (MSS) for valving and support reference standard.
   6. American Waters Association (AWWA) for Valving Assembly Standards.
7. American Society of Sanitation Engineers (ASSE) for Valving Standards.

8. American National Standards Institute (ANSI) for Piping Standards.


10. Crosslinked polyethylene (PEX) pipe conforming to ASTM F876, F877 and CSA B1375, or DIN 16892 and 16893.

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. See component manufacturers listed in individual articles below.

B. Cerro

C. Dodge Phelps

D. Tyler

E. ADS

F. Charlotte

G. Elkhart

H. Enfield

I. Spears

J. Nibco
K. Orion

L. American-USA

M. or approved equivalent.

N. Firestopping Penetrations in Fire Rated Wall Floor Assemblies:
   1. Hilti
   2. Proset
   3. 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.

2.3 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Cast Iron Pipe: ASTM A 74 extra heavy weight weight hub and spigot.
   1. Fittings: Cast iron.

   1. Fittings: Cast iron.
   2. Coupling Assembly:
      a. Heavy Duty: ASTM C1540/HUSKYSD4000, Clamp-All Hi-Torq 125 coupling. Husky SD 4000. FM-1680 approved.
2.4 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, ABOVE GRADE

   1. Fittings: Cast iron.
   2. Coupling Assembly:

B. Copper Tube: ASTM B 306, DWV

2.5 PUMP WASTE PRESSURE PIPING (PUMPED DISCHARGE)

A. Above Grade : Type "L" copper with solder joints.
B. Below Grade: Type "L" copper with brazed joints.

2.6 WATER PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Copper Pipe: ASTM B88, hard drawn, Type K (A).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

   1. Fittings: Ductile or gray iron, standard thickness.

2.7 HOT AND COLD DOMESTIC WATER ABOVE GRADE

A. Copper Tube: 3-inches and above. ASTM B88 (ASTM BA88m), Type L (B), Drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

B. Copper Tube: 2-1/2-inches and smaller. ASTM B88 (ASTM B88M), Type L (B), Drawn.
   1. Fittings: ASME B16.18 copper.

2.8 CONDENSATE PIPING

A. Copper Tube: ASTM B 88 (ASTM B898M), Type M (C)

B. Piping for drainage of condensate from combustion fuel sources (such as condensing boilers and water heaters) is to be chemical resistant piping as noted in this Section for area of application.

2.9 PRIMER PIPING

A. Above Ground: Type L hard-drawn copper tubing with wrought sweat fittings and soldered joints.

B. Belowground: Type L soft annealed copper tubing with wrought sweat fittings and brazed joints.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Underground Piping Systems Examination:
   1. Verify that excavations are to required grade, dry, and not over-excavated.

B. General:
   1. Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work at no expense to Owner.
   2. 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.
   3. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of testing laboratory.
   4. 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.
5. Support Foundations:
   a. 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.

   b. 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.

   c. 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>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>3/4-inch Square</td>
<td>27</td>
<td>47</td>
</tr>
<tr>
<td>Opening</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

d. 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.

6. Backfilling:
   a. Following installation and successful completion of required tests, backfill piping
in lifts.

      1) 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.

      2) Place and compact backfill above "Pipe Zone" in layers not to exceed
       12-inches in depth.

   b. Backfill Material:
1) Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.

2) Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

7. Compaction of Trench Backfill:
   a. Where compaction of trench backfill material is required, use one of following methods or combination thereof:
      1) Mechanical tamper,
      2) Vibratory compactor, or
      3) Other approved methods appropriate to conditions encountered.
   
   b. 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.

C. General Installation:

1. Work performed by experienced journeyman plumbers. No exceptions.
2. Provide access panels for concealed valves, shock arrestors, trap primers and the like.
3. Install pipes and pipe fittings in accordance with recognized industry practices and manufacturers recommendations.
5. 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.
a. Do not run piping through transformer vaults, telephone, elevator, electrical or electronic equipment spaces or enclosures unless indicated on Drawings.

b. 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. Provide plenum rated materials for ceiling spaces which are being used as plenums.

c. Exposed Work: Run pipes parallel to the closest wall unless otherwise shown on Drawings; maintain maximum headroom; avoid light fixtures.

d. Insulation Space Allowance: In piping work, allow space for pipe insulation and jackets. If interferences occur, move the piping to accommodate insulation thickness specified.

e. Pipe Lengths: Do not use short lengths or nipples at locations where a full length of pipe will fit.

f. 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.

g. 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.

h. Piping Leaks: Correct immediately; use new materials; leak-sealing compounds or peening not permitted.

i. 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.

j. 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.
k. 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.

D. Testing:

1. General:
   a. 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.

   b. Notify Architect and local Plumbing Inspector 2 days before tests.

   c. 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.

   d. 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.

   e. Send test results to Architect for review and approval and include in Operation and Maintenance Manual.

2. Testing of Pressurized Systems:
   a. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.

   b. 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.

3. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at hydrostatic pressure of 125 PSIG.

E. Corrosive Soil Conditions:
1. 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 recommendations.

2. Obtain and review project soils report for verification of requirements concerning corrosive soils.

F. Protection:

1. 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.

G. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:

1. Reference Division 7.

2. 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.

H. Piping to be cut squarely, free of rough edges and reamed to full bore. Piping to be fully inserted into fittings.

I. Provide joints of type indicated in each piping system.

J. Thread pipe in accordance with ANSI/ASME B1.20.1. 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.

K. Sleeves:

1. Pipe Sleeves:

   a. Layout work in advance of pouring concrete, furnish, and set sleeves necessary to complete work.

   b. Floor Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1-inch above finished floor. Caulk pipes passing through floor with non-shrinking grout or approved caulking compound (Except DWV Piping penetrating a concrete Slab set on Finish Grade), provide "Link-Seal" sleeve sealing system for concrete/slab penetrations which are below grade.
Caulk/seal piping passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements

c. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with non-shrinking caulking compound. Provide modular link sealing system for concrete penetrations which are below grade. Caulk/seal piping passing through fire-rated assemblies per local AHJ requirements.

d. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Indicate penetrations on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.

2. Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:
   a. Install fabricated pipe sleeve.
   b. After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve I.D.
   c. Seal each end airtight with a resilient nonhardening seal per code.

3. Piping penetrations through fire-rated (1 to 3 hour) assemblies:
   a. Select and install pre-engineered pipe penetration system in accordance with UL listing and manufacturer’s recommendation.
   b. Reference Division 7.
   c. 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 E84.

3.2 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Excavation and Backfill:
   1. See 3.01B. above.
B. 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.

C. Corrosive Soil Conditions:

1. 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.

2. Provide epoxy coated cast iron pipe and fittings for drainage systems.

D. Cast-Iron Joints: Comply with coupling manufacturer's Cast Iron Soil Pipe Institute Standards and installation instructions.

E. Sanitary and Storm Drainage:

1. Piping to be graded at a uniform pitch of 2 percent unless otherwise noted on Drawings.

2. 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.

3. Fixture Carriers: Concealed fixture carriers for wall hung plumbing fixtures are specified in Section 22 40 00.

4. Drains:
   
a. 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.

b. 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.

5. Wall Access Panel: Secure to wall framing and install so that flange forms a close fitting joint with the finished wall surface.

6. Heat trace and insulate P-traps exposed to freezing conditions. Provide heat trace and electronic components to Division 26 for installation.

7. Insulate horizontal branch lines from floor sinks, receptors and drains receiving cold discharge from equipment and appliances.
3.3 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, ABOVE GRADE

A. 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.

B. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:
   1. Reference Division 7.
   2. 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.

C. Solder copper tube and fitting joints with lead free nickel/silver bearing solder meeting ASTM std. B-32, in accordance with IAPMO Is 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.

D. Cast-Iron Joints: Comply with coupling manufacturer's Cast Iron Soil Pipe Institute Standards and installation instructions.

E. Sanitary and Storm Drainage:
   1. Piping to be graded at a uniform pitch of 2 percent unless otherwise noted on Drawings.
   2. 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.
   3. Fixture Carriers: Concealed fixture carriers for wall hung plumbing fixtures are specified in Section 22 40 00.
   4. Drains:
      a. 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.
b. 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.

5. Wall Access Panel: Secure to wall framing and install so that flange forms a close fitting joint with the finished wall surface.

6. Heat trace and insulate P-traps exposed to freezing conditions. Provide heat trace and electronic components to Division 26 for installation.

7. Insulate horizontal branch lines from floor sinks, receptors and drains receiving cold discharge from equipment and appliances.

3.4 PUMP WASTE PRESSURE PIPING (PUMPED DISCHARGE)

A. Excavation and Backfill:
   1. See 3.01 B. above.

B. 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.

C. 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.

D. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:
   1. Reference Division 7.

   2. 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.

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. 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.

G. 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.

H. Sanitary and Storm Drainage:

1. Piping to be graded at a uniform pitch of 2 percent unless otherwise noted on Drawings.

2. 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.

3. Fixture Carriers: Concealed fixture carriers for wall hung plumbing fixtures are specified in Section 22 40 00.

4. Drains:
   a. 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.
   b. 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.

5. Wall Access Panel: Secure to wall framing and install so that flange forms a close fitting joint with the finished wall surface.

6. Heat trace and insulate P-traps exposed to freezing conditions. Provide heat trace and electronic components to Division 26 for installation.

7. Insulate horizontal branch lines from floor sinks, receptors and drains receiving cold discharge from equipment and appliances.

3.5 WATER PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Excavation and Backfill:

1. See 3.01 B. above.

B. 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.

C. Domestic Water:

1. "Piping" to include pipes, fittings, nipples, valves and accessories connected thereto.
2. 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.

3. Grade water supply piping for complete drainage of the system. Install hose bibbs at low points.

4. Piping connections to equipment to be made up with unions.

5. Provide sufficient elbows, swings and offsets to permit free expansion and contraction.

6. Use reducers or increasers. Use no bushings.

7. Ream or file each pipe to remove burrs. Inspect each length of pipe and each fitting for workmanship and clear passageways.

8. 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.

9. 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.

10. Ferrous to non-ferrous connections to be made by means of dielectric fittings.

11. 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.

12. 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.

13. Provide drain valves at base of risers and at low points on the system.


D. Sterilization of Domestic Water System:

1. General: Upon completion of tests and necessary replacements, thoroughly flush and disinfect domestic water piping.

2. 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, flush and return system to service.


4. Provide water line disinfections performed by a licensed contractor with training in potable water line disinfections.

5. Provide water line disinfections performed by a D1 Water Operator licensed in the State of California.

E. Buried Preinsulated Pipe Installation:

1. Installation and Testing: Install and test products in accordance with manufacturer’s installation instructions.

2. Manufacturer’s installation instructions shall describe the following:
   a. Storage and handling of pipes.
   b. Trench preparation.
   c. Installing pipe.
   d. Installing accessories.
   e. Installing fittings.
   f. Building penetrations.
   g. Field insulation kits.
   h. Testing.

3.6 HOT AND COLD DOMESTIC WATER ABOVE GRADE

A. 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.

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.

D. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:
   1. Reference Division 7.
   2. 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.

E. Solder copper tube and fitting joints with lead free nickel/silver bearing solder meeting ASTM std. B-32, in accordance with IAPMO Is 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.

F. 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.

G. Domestic Water:
   1. "Piping" to include pipes, fittings, nipples, valves and accessories connected thereto.
   2. 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.
   3. Grade water supply piping for complete drainage of the system. Install hose bibbs at low points.
   4. Piping connections to equipment to be made up with unions.
   5. Provide sufficient elbows, swings and offsets to permit free expansion and contraction.
   6. Use reducers or increasers. Use no bushings.
7. Ream or file each pipe to remove burrs. Inspect each length of pipe and each fitting for workmanship and clear passageways.

8. 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.

9. 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.

10. Ferrous to non-ferrous connections to be made by means of dielectric fittings.

11. 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.

12. 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.

13. Provide drain valves at base of risers and at low points on the system.


H. Sterilization of Domestic Water System:

1. General: Upon completion of tests and necessary replacements, thoroughly flush and disinfect domestic water piping.

2. 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, reflush and return system to service.


4. Provide water line disinfections performed by a licensed contractor with training in potable water line disinfections.

5. Provide water line disinfections performed by a D1 Water Operator licensed in the State of California.

3.7 CONDENSATE PIPING

A. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:
1. Reference Division 7.

2. 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.

3.8 PRIMER PIPING

A. Excavation and Backfill:

1. See 3.01 B. above.

B. 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.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. General Plumbing Fixtures:
   a. China Fixtures, White Only
   b. Faucet Fittings
   c. Fiberglass Fixtures, White Only
   d. Molded Resin or Stone Fixtures
   e. Shower Valves
   f. Stainless Steel Fixtures
   g. Thermostatic Mixing Valves

2. Carriers

3. Drinking Fountains

4. Electric Water Coolers

5. Emergency Showers/Eyewash

6. Fixture Trim

7. Floor Drains

8. Floor Sinks

9. Flushometers - Water Closet/Urinal

10. Hose Bibbs

11. Kitchen Equipment

12. Water Closet Seats
13. Drain Boxes

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.

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.

B. In addition, meet the following:

1. Comply with lead free (less than or equal to 0.25 percent) products in drinking water systems.


4. IAPMO Low Lead Certification.


6. Provide fixtures, faucets and accessories to meet barrier free requirements of the governing code with respect to plumbing fixtures provided for the physically handicapped.


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. "Or approved equivalent" as defined in 22 00 00, General Plumbing Requirements. Substitution process requirements apply to approved equivalent products.

B. General Plumbing Fixtures: See Schedule on Drawings for type.

1. China Fixtures - White Only:
   a. American Standard
   b. Briggs
   c. Crane
   d. Eljer
   e. Kohler
   f. Universal-Rundle
   g. Or approved equivalent.

2. Faucet Fittings:
   a. Private:
      1) Chicago
      2) Delta Commercial
      3) Moen
      4) Speakman
      5) Symmons
      6) T&S Brass
      7) Or approved equivalent.
   b. Public:
      1) American Standard
2) Chicago

3) Delta Commercial

4) Moen Commercial

5) Sloan

6) Symmons

7) T & S Brass

8) Or approved equivalent.

3. Fiberglass Fixtures - White Only:
   a. Aqua-Glass
   b. Briggs
   c. Crane
   d. Fiber-Fab
   e. Hytec
   f. Mustee
   g. Universal-Rundle
   h. Or approved equivalent.

4. Molded Resin or Stone Fixtures:
   a. Fiat
   b. Mustee
   c. Stern Williams
   d. Or approved equivalent.

5. Shower Valves:
   a. Acorn
   b. Chicago
c. Delta

d. Moen

e. Powers

f. Symmons

g. Or approved equivalent.

6. Stainless Steel Fixtures:

a. Elkay

b. Haws

c. Just

d. Or approved equivalent.

7. Thermostatic Mixing Valves:

a. Bradley

b. Powers

c. Symmons

d. Or approved equivalent.

C. Carriers:

1. JR Smith

2. Zurn

3. Or approved equivalent.

D. Drinking Fountain:

1. Elkay

2. Halsey-Taylor

3. Haws

4. Oasis
5. Sunroc
6. Or approved equivalent.

E. Electric Water Coolers:
   1. Elkay
   2. Halsey-Taylor
   3. Haws
   4. Oasis
   5. Sunroc
   6. Or approved equivalent.

F. Emergency Showers/Eyewash:
   1. Bradley
   2. Encon
   3. Guardian
   4. Haws
   5. Speakman
   6. Or approved equivalent.

G. Fixture Trim:
   1. McGuire
   2. Or approved equivalent.

H. Floor Drains:
   1. Mifab
   2. Sioux Chief
   3. Smith
   4. Wade
5. Watts
6. Zurn

I. Floor Sinks:
   1. Commercial Enameling
   2. Mifab
   3. Sioux Chief
   4. Smith
   5. Wade
   6. Watts
   7. Zurn
   8. Or approved equivalent.

J. Flushometers - Water Closet/Urinal:
   1. Delaney
   2. Sloan
   3. Zurn
   4. Or approved equivalent.

K. Hose Bibbs:
   1. Chicago
   2. JR Smith
   3. Mifab
   4. Wade
   5. Woodford
   6. Zurn
   7. Or approved equivalent.
L. Kitchen Equipment:

1. No products specified. See Part 3 "Kitchen Equipment" article below for additional information.

M. Water Closet Seats:

1. Bemis
2. Or approved equivalent.

N. Drain Boxes:

1. Sioux Chief
2. Or approved equivalent.

2.2 GENERAL PLUMBING FIXTURES

A. Review substitution request requirements in Division 01, General Requirements and 22 00 00, Plumbing General Requirements.

B. Reference Architectural Details for mounting height and location of fixtures.

C. Provide factory fabricated fixtures of type, style and material indicated on the plumbing fixture connection schedule shown on the Drawings. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by manufacturer, or required for complete installation. Where more than one type is indicated, selection is installer's option; but, fixtures of same type must be furnished by a single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

D. Provide fixtures complete with fittings, supports, fastening devices, bolt caps, faucets, valves, traps, stops and appurtenances.

E. Plumbing Fixture Flow Rates:

1. Water Closets: Single flush 1.28 GPF or dual flush at 1.6/1.1 GPF.
2. Lavatories in public core areas to be set for 0.5 GPM max. Other lavatories to be 1.0 GPM flow.
3. Sinks to be set for 1.0 GPM flow max.
4. Showers factory set at a maximum of 1.8 - 2 GPM flow.
2.3 CARRIERS

A. Wall Hung Water Closets:

B. Wall Hung Urinal: Zurn Z-1218-WS. (JR Smith 913). Coupling type or plate type with bearing plate 300 lb. capacity.

C. Wall Hung Lavatory: Zurn Z-1231 (D). (JR Smith 700). Connected arm, 250 lb. capacity.


E. Wall Hung Drinking Fountain: Z-1225-BL (JR Smith 834-97-98). Plate type.

2.4 DRINKING FOUNTAINS

A. See Schedule on Drawings for type.

2.5 ELECTRIC WATER COOLERS

A. See Schedule on Drawings for Type.

2.6 EMERGENCY SHOWERS/EYEWASH

A. Provide emergency showers/eyewash products that are compliant with ANSSI Z358.1, Standards for Emergency Eyewashes and Shower Equipment.

2.7 FIXTURE TRIM

A. Traps: Provide heavy duty commercial grade traps on fixtures except fixtures with integral traps. Exposed traps will be chromium plated cast brass or 17 gauge chromium plated brass tubing.
   1. Sink: McGuire 8912-C-DF.
   2. Lavatory: McGuire 8902-C-DF.

B. Supplies and Stops: Lead free heavy duty commercial grade, chrome plated with brass stems. Stops: Loose key type.
1. Lavatory: McGuire LFH 2165 CK
2. Sink: McGuire LFH 2167 LK
3. Water Closets: McGuire

C. Grid strainer: McGuire 155A.
D. Sink strainer: McGuire 152N.
E. Trim barrier-free wrap for P-traps and supplies by McGuire, Pro-Wrap, Plumberex or True-bro.
F. Escutcheons: McGuire wrought brass deep bell.
G. Wax Rings and Toilet Bolts: WM Harvey No Seep No. 1 053065-N.

2.8 FLOOR DRAINS
A. See Schedule on Drawings for types.

2.9 FLOOR SINKS
A. See Schedule on Drawings for types.
B. Plastic components are not allowed.

2.10 FLUSHOMETERS - WATER CLOSET/URINAL
A. See Schedule on Drawings for types.

2.11 HOSE BIBBS
A. See Schedule on Drawings for types.

2.12 KITCHEN EQUIPMENT
A. No products specified. See Part 3 "Kitchen Equipment" article below for additional information.

2.13 WATER CLOSET SEATS
A. See Schedule on Drawings for type.

2.14 DRAIN BOXES:
A. See Schedule on Drawings for Type.
PART 3 - EXECUTION

3.1 GENERAL PLUMBING FIXTURE INSTALLATION INFORMATION

A. Install components in accordance with manufacturers instructions and approved product data submittals.

B. Set plumb, level and rigid.

C. Verification of Conditions:

1. Examine rough-in work of water supply and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.

2. Examine walls, floors and cabinets for suitable conditions where fixtures are to be installed.

3. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings and pertinent codes and regulations, design and referenced standards.

4. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.

5. Install a stop valve in a readily accessible location in water connection to each fixture.

6. Install escutcheons at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.

7. Seal fixtures to walls and floors using silicone sealant Dow Corning No. 780 or approved equivalent. Match sealant color to fixture color.

8. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.

9. Inspect each unit for damage prior to installation. Replace damaged fixtures.

10. Replace washers or cartridges of leaking or dripping faucets and stops.

11. Clean fixtures, trim and strainers using manufacturer's recommended cleaning methods and materials.

12. During construction, cover installed fixtures, drains, sinks and water coolers with cardboard and wrap with sheet plastic.
13. Provide trap primers for floor drains, floor sinks, trench drains and hub drains.

14. Install roof and overflow roof drains per architectural details. Cover drains during roof construction to protect drain. Provide offsets or expansion joints at each roof/overflow drain.

15. Do not use lead flashing.

D. Owner Furnished Equipment:

1. Rough-in and make final connections to Owner furnished equipment. Provide necessary items to complete installation.

2. Comply with requirements of this Section and Drawings for installation procedures.

E. Adjusting and Cleaning:

1. Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.

F. Extra Stock:

1. Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner.

G. Field Quality Control:

1. Upon completion of installation of plumbing fixtures, test fixtures to demonstrate capability and compliance with Specifications. Correct or replace malfunctioning units at site, then retest to demonstrate compliance.

H. Protection:

1. Protect fixtures and equipment from damage. Cover finished fixtures with cardboard and sheet plastic. Fixtures are not to be used during construction. Replace damaged items with new.

3.2 CARRIERS INSTALLATION

A. Coordinate wall thickness so carrier has adequate depth to be concealed.

3.3 FLOOR SINK INSTALLATION

A. Set plumb, level and rigid. Set fixture rim/grate flush with surrounding finish surface unless specifically noted otherwise.
3.4 FLUSHOMETERS - WATER CLOSET/URINAL INSTALLATION

A. Set plumb, level and rigid. Set fixture rim/grate flush with surrounding finish surface unless specifically noted otherwise.

3.5 KITCHEN EQUIPMENT INSTALLATION

A. Install components in accordance with manufacturers instructions and approved product data submittals.

B. Furnish and install shutoff valves, pressure regulators, shock arrestors, vacuum breakers, strainers, indirect waste piping, backflow preventers, and other devices or piping which are not furnished with kitchen equipment or shown on Drawings.

C. Set plumb, level and rigid.

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

C. General: Reference standards and guidelines include but are not limited to the latest adopted editions from:

   1. ABA Architectural Barriers Act
   2. ABMA American Bearing Manufacturers Association
   3. ADA Americans with Disabilities Act
4. AHRI  Air-Conditioning Heating & Refrigeration Institute  
5. AMCA  Air Movement and Control Association  
6. ANSI  American National Standards Institute  
7. ASCE  American Society of Civil Engineers  
8. ASHRAE  American Society of Heating, Refrigeration and Air-Conditioning Engineers  
9. ASHRAE  Guideline 0, The Commissioning Process  
10. ASME  American Society of Mechanical Engineers  
11. ASPE  American Society of Plumbing Engineers  
12. ASSE  American Society of Sanitary Engineering  
13. ASTM  ASTM International  
14. AWWA  American Water Works Association  
15. CFR  Code of Federal Regulations  
16. CGA  Canadian Gas Association  
17. CHPS  Collaborative for High Performance Schools  
18. CISPI  Cast Iron Soil Pipe Institute  
19. CSA  CSA International  
20. EPA  Environmental Protection Agency  
21. ETL  Electrical Testing Laboratories  
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.

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. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.
C. 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. 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.

7. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

8. 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, including resulting charges for work performed under other Divisions, 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.

9. 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.

10. Samples: Provide samples when requested by individual Sections.

11. 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.

12. Operation and Maintenance Manuals, Owners Instructions:

a. Submit, at one time, 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.

13. 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. Provide products which are UL 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 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. 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 crawlspaces 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. Plenums: Materials within plenums shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723. Immediately notify Architect / Engineer of any 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, Section 23 00 00, HVAC Basic Requirements and individual Division 23 HVAC Sections.

B. Equipment Importance Factor: 1.0.

C. General:

1. Confirm Building Risk 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.

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 and DSA. 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 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.

D. Training and Demonstration per Division 01 specifications for General Commissioning Requirements.

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, 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.

1. Do not place equipment in sustained operation prior to initial balancing of HVAC systems.

D. Provide miscellaneous supports/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 29
HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Hangers and Supports for HVAC Piping, Ductwork and Equipment
   2. Building Attachments
   3. Flashing
   4. Miscellaneous Metal and 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. 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.

4. 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. 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. Hangers and Supports for HVAC Piping, Ductwork and Equipment:
   1. Anvil International
   2. B-Line Systems, Incorporated
   3. Erico Company, Incorporated
   4. Nelson-Olsen Incorporated
   5. Rilco Manufacturing Company, Incorporated
   6. Snappitz Thermal Pipe Shield Manufacturing
   7. Unistrut Corporation
   8. Or approved equivalent.

B. Building Attachments:
   1. Anchor-It
   2. Gunnebo Fastening Corporation
   3. Hilti Corporation
   4. ITW Ramset/Red Head
   5. Masterset Fastening Systems, Incorporated
   6. Or approved equivalent.
2.2 HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

A. 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 MSS.

B. 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.

C. Channel Hanging System:
   1. 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.
   2. Concrete Inserts: Malleable iron body, hot tipped galvanized finish. Lateral adjustment. MSS Type 18.

D. Continuous Concrete Insert: Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.

E. Pipe Hangers:
   1. Pipe Rings for Hanger Rods:
      a. Pipe Sizes 2-inches and Smaller: Adjustable swivel ring hanger, UL listed. Erico 100 or 101, Anvil Figures 69 or 104, or approved equivalent.
      b. Pipe Sizes 2-1/2-inches and Larger: Clevis type hangers with adjustable nuts on rod, UL listed. Anvil figure 260, Erico 400, or approved equivalent.
      c. Pipe hangers to have same finish as hanger rods.

F. Pipe 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).

G. Riser Clamps: Steel, UL listed. MSS Type 8. Erico 510 or 511. Copper coated; Erico 368.
H. 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.

I. Pipe Guides:
   1. 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.
   2. Furnish and install guides approximately four 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.

J. Pipe Roller Hangers: Adjustable roller hanger. Black steel yoke, cast iron roller. MSS Type 41.

K. Below Ground Pipe Supports:
   2. Rod: 5/8-inch stainless steel Type 18-8.

L. Thermal Hanger Shield Inserts:
   1. 100-PSI (690-kPa) minimum compressive strength calcium silicate insulation, encased in sheet metal shield or polyisocyanurate rigid foam exceeding the load bearing weight of the pipe at the hanger point with a PVC vapor barrier.
   2. Material for Cold Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with vapor barrier or polyisocyanurate rigid foam with a PVC vapor barrier.
   3. Material for Hot Piping: Water-repellent-treated ASTM C533, Type 1 calcium silicate or polyisocyanurate rigid foam with a PVC vapor barrier.
   4. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
   5. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
6. Insert Length: Extend 2-inches beyond sheet metal shield for piping operating below ambient air temperature.

7. Thermal Hanger Shield Insulation Operating Temperature: Meet or exceed fluid temperature in pipe.

M. Freestanding Roof Supports: Polyethylene high-density UV resistant quick "pipe" block with foam pad.

2.3 BUILDING ATTACHMENTS

A. Beam Clamps:
   1. MSS Type 19 and 23, wide throat, with retaining clip.
   2. Universal Side Beam Clamp: MSS Type 20.

B. 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.

C. Anchor Bolts:
   1. Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer. Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
   2. 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.
   3. 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.

2.4 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.
2.5 MISCELLANEOUS METAL AND MATERIALS

A. General:

1. Provide miscellaneous metal items specified, 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. Contractor is responsible for their design.

2. 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.

I. Grout:

1. ASTM C1107, Grade B, factory mixed and packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.

2. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
3. **Properties:** Nonstaining, noncorrosive, and non gaseous.

4. **Design Mix:** 5000-PSI (34.5-MPa), 28-day compressive strength.

### PART 3 - EXECUTION

#### 3.1 GENERAL INSTALLATION REQUIREMENTS

A. Verify building materials to have hangers and attachments affixed in accordance with hangers to be used. Provide supporting calculations.

B. 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.

C. 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.

D. **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.

#### 3.2 HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

A. 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.

B. Support horizontal ducts within 24-inches of each elbow and within 48-inches of each branch intersection.

C. Provide aluminum supports for aluminum ductwork.

D. Provide stainless steel supports for stainless steel ductwork.

E. Support vertical ducts at maximum intervals of 16-feet and at each floor.

F. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
G. Use double nuts and lock washers on threaded rod supports.

H. Floor supports in mechanical rooms to be elevated 1-inch above finish floor and void space filled with masonry grout.

I. 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.

J. Attach strap hangers installed flush with end of sheet-metal duct run to duct with sheet-metal screws.

K. Construct exterior ductwork or ductwork which is otherwise exposed to weather watertight and slope 1/4-inch per foot to avoid standing water.

L. 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.

M. Channel Support System Installation:
   1. Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
   2. Field assemble and install according to manufacturer's written instructions.

N. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

O. 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.

P. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Q. 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.

R. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted.

S. 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. Pipe support spacing (pipe supported in ceiling or floor-supported) to meet latest applicable Code and manufacturer's requirements.

5. Provide copper-plated hangers and supports for uninsulated copper piping systems.

T. Plumber's Tape not permitted as pipe hangers or pipe straps.

U. 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.

V. Pipe Ring Diameters:
   1. Uninsulated and Insulated Pipe, Except Where Oversized Pipe Rings are Specified: Ring inner diameter to suit pipe outer diameter.
   2. Insulated Piping Where Oversized Pipe Rings are Specified and Vibration Isolating Sleeves: Ring inner diameter to suit outer diameter of insulation or sleeve.

W. Oversize Pipe Rings: Provide oversize pipe rings of 2-inch and larger size.

X. Pipe Support Brackets: Support pipe with pipe slides.

Y. Steel Backing in Walls: Provide steel backing in walls to support fixtures and piping hung from steel stud walls.

Z. Pipe Guides:
   1. 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.
   2. Install approximately four 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.

AA. Heavy-Duty Steel Trapeze Installation:
1. Arrange for grouping of parallel runs of horizontal piping and support together on field fabricated, heavy-duty trapezes.

2. 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.

3. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

AB. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers. Maximum spacings: MSS SP-58.

AC. 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.

AD. Do not support piping from other piping.

AE. Fire protection piping will be supported independently of other piping.

AF. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

AG. 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.

AH. Insulated Piping:

1. Attach clamps and spacers to piping.

2. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.

3. Piping Operating Below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

4. Do not exceed pipe stress limits according to ASME B31.9.

5. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

6. 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.

7. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields to span arc of 180 degrees.
8. 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.

9. Shield Dimensions for Pipe, not less than the following:
   a. NPS 1/4 to NPS 3-1/2 (DN8 to DN 90): 12-inches long and 0.048-inch thick.
   b. NPS 4 (DN100): 12-inches long and 0.06-inch thick.
   c. NPS 5 and NPS 6 (DN125 and DN150): 18-inches long and 0.06-inch thick.
   d. NPS 8 to NPS 14 (DN200 to DN350): 24-inches long and 0.075-inch thick.
   e. NPS 16 to NPS 24 (DN400 to DN600): 24-inches long and 0.105-inch thick.

10. Pipes NPS 8 (DN200) and Larger: Include wood inserts.

11. Insert Material: Length at least as long as protective shield.

12. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

AI. Pipe Anchors: Provide anchors to fasten piping which is subject to expansion and contraction, and adjacent to equipment to prevent loading high forces onto the equipment.

AJ. 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. 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.

AK. 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.

AL. 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.
      a. Riser to be supported at each floor of penetration.
b. Provide structural steel supports at the base of pipe risers. Size supports to carry forces exerted by piping system when in operation.

AM. Piping above roof to be supported with freestanding roof pipe supports unless detailed otherwise.

3.3 BUILDING ATTACHMENTS

A. Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions and in accordance manufacturer's published product information.

B. Select size of building attachments to suit hanger rods.

C. Install concrete inserts before placing concrete.

D. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

E. Do not use powder-actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4-inches thick.

F. 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.

G. 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.

H. 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.

I. 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.

J. 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.

K. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
L. Bolting: 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.

M. Anchor Bolts:
   1. 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.

N. Testing: Test powder-actuated insert attachments with a minimum load of 100 pounds.

3.4 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.

3.5 MISCELLANEOUS METAL AND MATERIALS

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: 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.

C. 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.

D. 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.

E. 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.

F. 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.


H. 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.

I. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

J. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.
K. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

L. 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.

M. Provide galvanized components for items exposed to weather.

END OF SECTION
SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

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. 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: 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 CBC Chapter 16.

b. Seismic Design Category:

1) Confirm Seismic Design Category with Architect.

2) Seismic Design Category: D for mechanical equipment and systems.

c. Building Risk Category:

1) Confirm Building Risk Category with Architect.

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.

3) 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. Factory Finishes:
   1. Kynar 500 Fluoropolymer Coating
   2. Or approved equivalent.

D. 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 5b- Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.

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.
   Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

7. **Mason Type**: 30N.

**H. 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.

**I. Type 6 - Horizontal Thrust Restraints**: Combination coil spring and elastomeric insert with spring and insert in compression and with a load stop. Include rod and angle-iron brackets for attaching to equipment.

1. **Frame**: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment 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. **Coil Spring:** Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

8. **Mason Type:** WBI or WBD

J. **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.

K. **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.

L. **Type FC-1, Flexible duct connectors.** See Specification Section 23 33 00 Air Duct Accessories.

M. **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.

N. **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.

O. 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.

P. 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: 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. Conform to AAMA 605.2.

   2. Apply coating following cleaning and pretreatment.

   3. Cleaning: AA-C12C42R1X.

   4. Dry system before final finish application.

   5. Total Dry Film Thickness: Approximately 1.2 mils, when baked at 450 degrees F for 10 minutes.

B. Finish:

   1. Manufacturer's standard paint applied to factory-assembled and factory-tested equipment before shipping.
2. Powder coating on springs and housings.

3. Hardware be electrogalvanized. Hot-dip galvanize metal components for exterior use.

4. Baked enamel for metal components on isolators for interior use.

5. 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 Restraint Components: Rated strengths, features and applications to 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 GENERAL INSTALLATION REQUIREMENTS

A. 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.

B. Provide mounts for equipment installed outdoors for wind loads of 30 lbs. psf applied to any exposed surface of isolated equipment.

C. Do not install equipment or pipe which makes rigid contact with building slabs, beams, studs, walls, etc.

D. 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.

E. 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.
F. Provide roof curbs, equipment supports and roof penetrations. Work to maintain roof warranty. Coordinate location, size, structural connections/requirements and flashing prior to installation.

G. Install Type 6 horizontal thrust restraints at centerline of thrust, symmetrical on either side of equipment.

H. 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.

I. Pipe Hangers in Equipment Rooms: Support water and gas piping connected to rotating equipment within equipment rooms on spring and neoprene hangers. The first three hangers from a piece of vibrating equipment are to have a minimum of 1/2 static deflection of equipment isolators. Other isolators should have a minimum of 1/4 static deflection of equipment isolators.

J. Examination:
   1. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements, installation tolerances and other conditions affecting performance.
   2. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

K. Testing: Perform following field quality-control testing:
   1. Isolator seismic-restraint clearance.
   2. Isolator deflection.
   3. Snubber minimum clearances.

L. Adjusting:
   1. Adjust snubbers according to manufacturer's written recommendations.
   2. Torque anchor bolts according to equipment manufacturer's written recommendations to resist seismic forces.

M. Cleaning: After completing equipment installation, inspect vibration isolation and seismic-control devices. Remove paint splatters and other spots, dirt and debris.
N. Demonstration: Engage factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate and maintain air-mounting systems. Reference Division 01, General Requirements.

3.2 VIBRATION ISOLATION

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer’s instructions and recommendations.

C. Vibration isolators must be installed in strict accordance with manufacturer’s written instructions and certified submittal data.

D. Install isolation as indicated on drawings by type and location and where indicated below.

E. 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>
</tr>
<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>
</tr>
<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>
</tr>
<tr>
<td>Condensing Units</td>
<td>0 to 4.5 tons</td>
<td>Type 1 or 2</td>
<td>0.2</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>
</tr>
<tr>
<td>Rooftop Air Handlers, AC, Heat Pump Units</td>
<td>20+ tons</td>
<td>RC-2, FC-1,2</td>
<td>1.5</td>
</tr>
<tr>
<td>Axial, Cabinet, Centrifugal Inline Fans</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>Axial, Cabinet, Centrifugal Inline Fans</td>
<td>24-inch+ diameter</td>
<td>Type 3, 4A, 4B, 5B, or 5C, FC-1</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Propeller Fans

| All | Type 2 or Type 5A, FC-1 | 0.25 |

F. 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.

G. 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.

H. Adjusting:

1. Adjust isolators after piping systems have been filled and equipment is at operating weight.

2. 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.

3. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop.
3.3 SEISMIC RESTRAINT DEVICES

A. Reference 3.01, General Installation Requirements.

B. Install in strict accordance with manufacturer's written instructions and certified submittal data.

C. Install and adjust seismic restraints so equipment, piping and ductwork supports are not degraded by restraints.

D. Restraints must not short circuit vibration isolation systems or transmit objectionable vibration or noise.

E. 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.

F. 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.

3.4 FACTORY FINISHES

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Finishes to be factory-applied. No field patching or holidays allowed.

3.5 SEISMIC-BRACING/RESTRAINT DEVICES/SYSTEMS FOR EQUIPMENT, PIPING AND DUCTWORK

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Adjust seismic restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION
SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Plastic Nameplates
   2. Tags
   3. Plastic Pipe Markers
   4. Ceiling Tags

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. Schedules:
      a. Submit valve schedule for each piping system, in tabular format using Microsoft Word or Excel software. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses by special "flags" in margin of schedule. In addition to mounted copies, furnish extra copies for maintenance manuals.

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. 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 23 00 00, HVAC 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 23, HVAC Sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Plastic Nameplates:

1. Brady Corporation
2. Brimar
3. Champion America
4. Craftmark
5. Seton
6. Or approved equivalent.

C. Tags:

1. Brady Corporation
2. Brimar
3. Champion America
4. Craftmark
5. Seton
6. Or approved equivalent.

D. Plastic Pipe Markers:
   1. Brady Corporation
   2. Brimar
   3. Champion America
   4. Craftmark
   5. Seton
   6. Or approved equivalent.

E. Ceiling Tags:
   1. Brady Corporation
   2. Brimar
   3. Champion America
   4. Craftmark
   5. Seton
   6. Or approved equivalent.

2.2 PLASTIC NAMEPLATES

A. Description: Engraving stock melamine 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.

   2. Letter Height: 1/2-inch.
   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.

2.3 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 2-inch diameter.

B. Metal Tags: Polished Brass with stamped letters; tag size minimum 2-inch diameter with smooth edges.

C. Valve designations to be coordinated with existing valve identifications to ensure no repetitive designations are utilized.

D. Chart/Schedules: Valve Schedule Frames. For each page of a valve schedule, provide glazed display frame with removable mounting as appropriate for wall construction upon which frame is to be mounted. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

E. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

F. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.
   1. Size: Approximately 4 by 7-inches.
   2. Fasteners: Brass grommet and wire.
   3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

2.4 PLASTIC PIPE MARKERS


B. Plastic Pipe Markers (for external diameters of 6-inches and larger including insulation): Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers (for external diameters less than 6-inches including insulation): Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Minimum information indicating flow direction arrow and identification of fluid being conveyed.
D. Lettering:

1. 3/4-inch to 1-1/4-inch Outside Diameter of Insulation or Pipe: 8-inch long color field, 1/2-inch high letters.
2. 1-1/2-inch to 2-inch Outside Diameter of Insulation or Pipe: 8-inch long color field, 3/4-inch high letters.
3. 2-1/2-inch to 6-inch Outside Diameter of Insulation or Pipe: 12-inch long color field, 1-1/4-inch high letters.
4. 8-inch to 10-inch Outside Diameter of Insulation or Pipe: 24-inch long color field, 2-1/2-inch high letters.
5. Over 10-inch Outside Diameter of Insulation or Pipe: 32-inch long color field, 3-1/2-inch high letters.

2.5 CEILING TAGS

A. Description: Steel with 3/4-inch diameter color coded head.

B. Color code as follows:

1. Yellow - HVAC equipment.
2. Red - Fire dampers/smoke dampers.
4. Ceiling tile labels, machine generated, adhesive backed tape labels with black letters, clear tape.

PART 3 - EXECUTION

3.1 GENERAL - INSTALLATION

A. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates riveted to equipment body.

B. Identify piping, concealed or exposed, with plastic pipe markers.

C. Coordinate names, abbreviations and other designations used in mechanical identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.
D. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Chiller No. 3, Air Handling Unit No. 42, Standpipe F12, and the like).

E. Degrease and clean surfaces to receive adhesive for identification materials.

F. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

G. Coordinate with the facility maintenance personnel to insure consistency with the existing tagging system.

H. Install all products in accordance with manufacturer’s instructions.

I. Manual Balancing Dampers: Provide 12-inch long orange marker ribbon to end of balancing damper handle.

3.2 PLASTIC NAMEPLATES

A. Install plastic nameplates with corrosive-resistant mechanical fasteners.

B. Identify control panels and major control components outside panels with plastic nameplates riveted to equipment body.

C. Identify thermostats with nameplates.

3.3 TAGS

A. Use metal tags on piping 3/4-inch diameter and smaller.

B. Tag balancing valves and major dampers with balanced GPM or CFM indicated after balancing is completed and accepted.

C. Install tags with corrosion resistant chain.

D. Small devices, such as in-line pumps, may be identified with tags.

E. Identify valves in main and branch piping with metal tags. Indicate valve function and the normally open or closed positions on the valve tag.

F. Identify air terminal units and radiator valves with numbered plastic tags.

G. Tag automatic controls, instruments, and relays. Key to control schematic.

H. Install valve schedule at each mechanical room.
3.4 PLASTIC PIPE MARKERS

A. Install plastic pipe markers complete around pipe in accordance with manufacturer’s instructions.

B. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20-feet (reduced to 10-feet in congested areas and mechanical equipment rooms) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction. Locate near branches, valves, control devices, equipment connections, access doors, floor/wall penetrations.

3.5 CEILING TAGS

A. Provide ceiling tile labels to identify valves, dampers, and equipment above accessible ceilings.

B. Provide ceiling tags to locate valves, dampers, and equipment above accessible ceilings. Locate in corner of ceiling tee grid closest to equipment.

END OF SECTION
SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. General Requirements and Procedures
   2. Fundamental Air Systems Balancing Procedures
   3. Temperature Control Verification
   4. Constant Volume Air Systems Balancing Procedures
   5. Pre-Balance Reporting
   6. Final Reports:
      a. Report Requirements
      b. General Report Data
      c. System Diagrams
      d. Air Handling Units
      e. Fans
      f. Duct Traverses
      g. Diffusers/Registers/Grilles
      h. Instrument Calibration
   7. Additional Tests

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. Quality-Assurance Submittals: Submit two copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.

2. Pre-Construction Phase Report:

   a. Provide a pre-construction phase TAB Plan at least two weeks prior to the commencement of TAB work. This report is to include:

      1) A complete set of report forms intended for use on the project, with all data filled in except for the field readings. Forms to be project specific.

      2) Marked up shop drawings identifying all HVAC equipment to be balanced, and associated outlets and terminal devices.

      3) Identification of the type, manufacturer, and model of the actual instruments to be used, and clear indication of which instrument will be used to take each type of reading. Calibration certifications are to be included.

      4) A narrative of any project specific and/or non-standard TAB procedures to be used, and the equipment or systems they apply to.

3. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit two copies of the Contract Documents review report as specified in Part 3 of this Section.


5. Specify reports required because of editing procedures in Part 3 of this Section.

6. Certified Testing, Adjusting, and Balancing Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

7. Sample Report Forms: Submit two sets of sample testing, adjusting, and balancing report forms.
8. Test Instrument Calibration: Submit proof of calibration within the last 6 months.


10. Provide additional submittals to commissioning authority as dictated in commissioning specifications.

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. Acceptable Balance Firm:
   a. General:
      1) Procure services of independent balance and testing agency which specializes in balancing and testing of plumbing, heating, ventilating, and air conditioning systems, to balance, adjust and test water circulating and air moving equipment and air distribution or exhaust systems. Minimum Experience: 5 years.

      b. Industry Standards: Testing and Balancing will conform to NEBB, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and American National Standards Institute (ANSI) as follows:
       2) ASHRAE: Comply with recommendations pertaining to measurements, instruments, and testing, adjusting and balancing.
       3) ANSI:
          a) S1.4 Specifications for sound level meters.
          b) S1.11 Specifications for Octave-Band and Fractional-Octave-Band analog and digital filters.
          c) ANSI S1.13 Methods for the Measurement of Sound Pressure Levels.

      c. Test Observation: If requested, conduct tests in the presence of the Architect or the Architect's representative.

2. Noise Criteria:
a. Noise levels in all 8 octave bands due to equipment and duct systems not-to-exceed the following NC levels:

<table>
<thead>
<tr>
<th>TYPE OF ROOM</th>
<th>NC LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathrooms and Toilet Rooms</td>
<td>35-40</td>
</tr>
<tr>
<td>Conference Room</td>
<td>30-35</td>
</tr>
<tr>
<td>Corridors (Public)</td>
<td>35-40</td>
</tr>
<tr>
<td>Lobbies, Waiting Areas</td>
<td>35-40</td>
</tr>
<tr>
<td>Offices, Large Open (3 or more occupants)</td>
<td>35-40</td>
</tr>
<tr>
<td>Offices, Small Private (2 or fewer occupants)</td>
<td>30-35</td>
</tr>
<tr>
<td>Kitchens</td>
<td>40-45</td>
</tr>
<tr>
<td>Classrooms (Small, Medium, Large)</td>
<td>30-35</td>
</tr>
<tr>
<td>Cafeteria/Dining</td>
<td>35-40</td>
</tr>
<tr>
<td>All Others</td>
<td>35-40</td>
</tr>
</tbody>
</table>

b. For equipment which has no sound power ratings scheduled on the Drawings, select equipment that the foregoing noise criteria, local ordinance noise levels, and OSHA requirements are not exceeded. Selection procedure in accordance with ASHRAE Fundamentals Handbook, Chapter 7, Sound and Vibration.

c. An allowance, not-to-exceed 5db, may be added to the measured value to compensate for the variation of the room attenuating effect between room test condition prior to occupancy and design condition after occupancy which may include the addition of sound absorbing material, such as furniture. This allowance may not be taken after occupancy. The room attenuating effect is defined as the difference between sound power level emitted to room and sound pressure level in room.

d. In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.

3. Allowable Vibration Tolerances for Rotating, Non-reciprocating Equipment:
   Not-to-exceed a self-excited vibration maximum velocity of 5 mm per second (0.20 inch per second) RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal and axial directions or measured at equipment mounting feet if bearings are concealed. Measurements for internally isolated fans and motors may be made at the mounting feet.

4. Provide proof of testing agency having successfully completed at least five projects of similar size and scope.
5. **Code Compliance**: Perform tests in the presence of the Authority Having Jurisdiction (AHJ) where required by the Authority Having Jurisdiction (AHJ).

6. **Owner Witness**: Perform tests in the presence of the Owners representative.

7. **Engineer Witness**: The engineer or engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.

8. **Simultaneous Testing**: Test observations by the Authority Having Jurisdiction (AHJ), the Owner's representative and the engineer's representative need not occur simultaneously.

9. Do not perform testing, adjusting, and balancing work until heating, ventilating, and air conditioning equipment has been completely installed and is operating continuously as required.

10. **Conduct air testing and balancing with clean filters in place. Clean strainers prior to performing hydronic testing and balancing.**

11. **Agent Qualifications**: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB.

12. **Testing, Adjusting, and Balancing Conference**: Meet with the Owner's and the Architect's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days advance notice of scheduled meeting time and location.

   a. **Agenda Items**: Include at least the following:

   1) Submittal distribution requirements.

   2) Contract Documents examination report.

   3) Testing, adjusting, and balancing plan.

   4) Work schedule and Project site access requirements.

   5) Coordination and cooperation of trades and subcontractors.

   6) Coordination of documentation and communication flow.

13. **Certification of Testing, Adjusting, and Balancing Reports**: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
a. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.

b. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.


16. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.

17. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

18. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument 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.

B. In addition, provide:

1. TAB Agency provides warranty for a period of 90 days following submission of completed report, during which time, Owner may request a recheck of up to 10 percent of total number of terminals, or resetting of any outlet, coil, or device listed in the final TAB report.

2. Guarantee: Meet the requirements of the following programs:

   a. Provide a guarantee on AABC or NEBB forms stating that the agency will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

      1) The certified Agent has tested and balanced systems according to the Contract Documents.

      2) Systems are balanced to optimum performance capabilities within design and installation limits.
1.7 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.

C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person’s skin than is normally dissipated.

D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

E. Report Forms: Test data sheets for recording test data in logical order.

F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

J. TAB: Testing and Balancing.

K. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

L. Test: A procedure to determine quantitative performance of a system or equipment.

M. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.


P. CTI: Cooling Tower Institute.

R. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.8 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Notice: Provide 7 days advance notice for each test. Include scheduled test dates and times.

C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS AND PROCEDURES

A. Project Conditions:

1. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner’s operations.

2. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner’s operations.

3. Non-Owner Occupancy: Complete balancing of building systems prior to Substantial Completion and owner occupancy.

B. General Requirements:

1. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and controls, coordinate scheduling and testing and inspection procedures with authorities having jurisdiction.

2. Perform TAB work with doors, closed windows, and ceilings installed etc., to obtain simulated or project operating conditions. Do not proceed until systems scheduled for testing, adjusting and balancing are clean and free from debris, dirt and discarded building materials.

3. Where Owner occupies building during the testing period, cooperate with Owner to minimize conflicts with Owner’s operations.
C. Examination:

1. Examine Contract Documents to become familiar with project requirements and existing building record documents (if available) to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
   
a. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
   
b. Verify that balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

2. Examine approved submittal data of HVAC systems and equipment.

3. Examine project record documents described in Division 01, General Requirements.

4. Examine Architect's and Engineer's design data, including Basis of Design, HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

5. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

6. Coordinate requirements in system and equipment with this Section.

7. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

8. Examine system and equipment test reports.

9. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and
their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

10. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

11. Examine equipment for installation and for properly operating safety interlocks and controls.


13. Beginning of work means acceptance of existing conditions.

D. Preparation:

1. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

2. Complete system readiness checks and prepare system readiness reports. Verify the following:
   a. Permanent electrical power wiring is complete.
   b. Hydronic systems are filled, clean, and free of air.
   c. Automatic temperature-control systems are operational.
   d. Equipment and duct access doors are securely closed.
   e. Balance, smoke, and fire dampers are open.
   f. Isolating and balancing valves are open and control valves are operational.
   g. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
   h. Windows, doors and other portions of the building envelope can be closed so design conditions for system operations can be met.

3. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   a. Attendance is required by installers whose work will be tested, adjusted, or balanced.

4. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
E. General Testing and Balancing Procedures:

1. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

2. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

3. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

F. Adjustment Tolerances:

1. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 percent of design for return and exhaust systems.

2. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3. Hydronic Systems: Adjust to within plus or minus 10 percent of design at coils and plus or minus 5 percent at system pumps and equipment.

4. Adjust supply, return, and exhaust air quantities to maintain pressurization in spaces indicated on Drawings. Note and document room-to-room pressurization and maintain these relationships. Adjust pressure controlled spaces to within plus or minus 0.01 in WC.

G. Recording and Adjusting:

1. Field Logs: Maintain written logs including:
   a. Running log of events and issues.
   b. Discrepancies, deficient or uncompleted work by others.
   c. Contract interpretation requests.
   d. Lists of completed tests.

2. Ensure recorded data represents actual measured or observed conditions.
3. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

4. Mark on drawings locations where traverse and other critical measurements were taken and cross reference location in final report.

5. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

6. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

7. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner's Representative, or Commissioning Agent.

3.2 FUNDAMENTAL AIR SYSTEMS BALANCING PROCEDURES

A. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

B. Examine terminal units, such as variable-air-volume boxes and mixing boxes, to verify that they are accessible and their controls are connected and functioning.

C. Examine plenum ceilings, utilized for supply air, to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.

D. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

E. Prepare test reports for both fans and inlets and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross check the summation of required outlet volumes with required fan volumes.

F. Prepare schematic diagrams of systems' "as-built" duct layouts.

G. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

H. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

I. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

J. Verify that motor starters are equipped with thermal protection, sized for the connected load.

K. Check dampers for proper position to achieve desired airflow path.
L. Check for airflow blockages.

M. Check that condensate drains are installed, trapped and primed and routed to drain.

N. Check for readily observable leaks in air-handling unit components and ductwork.

O. Use sheaves and pulleys to adjust the speed of belt drive fans to achieve design flow with motors running at 60 Hertz unless noted otherwise.

3.3 TEMPERATURE CONTROL VERIFICATION

A. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices operate by the intended controller.

2. Dampers and valves are in the position indicated by the controller.

3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.

4. Automatic modulating and shut off valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.

5. Thermostats and humidistats are located to avoid adverse effects of sunlight, equipment, drafts, and cold walls.

6. Sensors are located to sense only the intended conditions.

7. Sequence of operation for control modes is according to the Contract Documents.

8. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.

9. Interlocked systems are operating.

10. Changeover from heating to cooling mode occurs according to design values.

B. Verify that controllers are calibrated and commissioned.

C. Check transmitter and controller locations and note conditions that would adversely affect control functions.

D. Record controller settings and note variances between set points and actual measurements.

E. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).
F. Verify free travel and proper operation of control devices such as damper and valve operators.

G. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water-flow measurements. Note the speed of response to input changes.

H. Confirm interaction of electrically operated switch transducers.

I. Confirm interaction of interlock and lockout systems.

J. Verify main control supply-air pressure and observe compressor and dryer operations.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.4 CONSTANT-VOLUME AIR SYSTEMS BALANCING PROCEDURES

A. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer. Adjust fans to deliver design airflow at the lowest possible speed.

1. Measure fan static pressures to determine actual static pressure as follows:
   a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
   b. Measure static pressure directly at the fan outlet or through the flexible connection.
   c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
   d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each air-handling unit component under final balanced condition.

3. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Recommend corrective action to align design and actual conditions.

4. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.

5. Do not make fan-speed adjustments that result in motor loading greater than full load amps. Do not increase fan speed beyond fan class rating. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in
full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.

6. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.

7. Calibrate airflow measuring stations.

3.5 PRE-BALANCE REPORTING

A. Pre-Construction Phase Report:

1. Provide a pre-construction phase TAB Plan at least 2 weeks prior to the commencement of TAB work. This report is to include:

   a. A complete set of report forms intended for use on the project, with all data filled in except for the field readings. Forms to be project specific.

   b. Marked up shop drawings identifying all HVAC equipment to be balanced, and associated outlets and terminal devices.

   c. Identification of the type, manufacturer, and model of actual instruments to be used, and clear indication of which instrument will be used to take each type of reading. Calibration certifications are to be included.

   d. A narrative of any project specific and/or non-standard TAB procedures to be used, and the equipment or systems they apply to.

B. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

C. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced.

3.6 FINAL REPORTS

A. Report Requirements:

1. General:

   a. Computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into Sections by tested and balanced systems.
b. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

   1) Include a list of the instruments used for procedures, along with proof of calibration.

c. Final Report Contents: In addition to the certified field report data, include the following:

   1) Pump curves.
   2) Fan Curves
   3) Manufacturers Test Data
   4) Field test reports prepared by system and equipment installers.
   5) Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

B. General Report Data:

   1. In addition to the form titles and entries, include the following data in the final report, as applicable:

      a. Title Page
      b. Name and Address of Testing, Adjusting, and Balancing Agent
      c. Project Name
      d. Project Location
      e. Architect's Name and Address
      f. Engineer's Name and Address
      g. Contractor's Name and Address
      h. Report Date
      i. Signature of Testing, Adjusting, and Balancing Agent who Certifies the Report
      j. Summary of Contents, Including the Following:

         1) Design versus Final Performance
2) Notable Characteristics of Systems

3) Description of System Operation Sequence if it varies from the Contract Documents

k. Nomenclature Sheets for Each Item of Equipment

l. Data for Terminal Units, including Manufacturer, Type Size, and Fittings

m. Notes to explain why certain final data in the body of reports vary from design values.

n. Test Conditions for Fans and Pump Performance Forms, Including the Following:
   1) Settings for Outside-, Return-, and Exhaust-air Dampers
   2) Conditions of Filters
   3) Cooling Coil, Wet- and Dry-bulb Conditions
   4) Face and Bypass Damper Settings at Coils
   5) Fan Drive Settings, including Settings and Percentage of Maximum Pitch Diameter
   6) Inlet Vane Settings for Variable-Air-Volume Systems
   7) Settings for Supply-air, Static-pressure Controller
   8) Other System Operating Conditions that affect Performance

C. System Diagrams:

   1. Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:
      a. Quantities of Outside, Supply, Return, and Exhaust Airflows
      b. Water and Steam Flow Rates
      c. Duct, Outlet, and Inlet Sizes
      d. Pipe and Valve Sizes and Locations
      e. Terminal Units
      f. Balancing Stations
D. Air Handling Units:

1. For air-handling units, packaged rooftop unit air handlers, split systems, fan coils, heat pumps, and evaporator units with coils, include the following:

   a. Unit Data: Include the following:
      1) Unit Identification
      2) Location
      3) Make and Type
      4) Model Number and Unit Size
      5) Manufacturer’s Serial Number
      6) Unit Arrangement and Class
      7) Discharge Arrangement
      8) Sheave Make, Size in inches, and Bore
      9) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches
      10) Number of Belts, Make, and Size
      11) Number of Filters, Type, and Size

   b. Motor Data: Include the following:
      1) Make and Frame Type and Size
      2) Horsepower and rpm
      3) Volts, Phase, and Hertz
      4) Full-load Amperage and Service Factor
      5) Sheave Make, Size in Inches, and Bore
      6) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches

   c. Test Data: Include design and actual values for the following:
1) Total Airflow Rate in cfm (L/s)
2) Total System Static Pressure in Inches wg (Pa)
3) Fan rpm
4) Discharge Static Pressure in Inches wg (Pa)
5) Filter Static-pressure Differential in Inches wg (Pa)
6) Preheat Coil Static-pressure Differential in Inches wg (Pa)
7) Cooling Coil Static-pressure Differential in Inches wg (Pa)
8) Heating Coil Static-pressure Differential in Inches wg (Pa)
9) Outside Airflow in cfm (L/s)
10) Return Airflow in cfm (L/s)
11) Outside-air Damper Position
12) Return-air Damper Position
13) Vortex Damper Position

E. Fans:

1. Fan Test Reports: For supply, return, and exhaust fans, include the following:

   a. Fan Data: Include the following:

      1) System Identification
      2) Location
      3) Make and Type
      4) Model Number and Size
      5) Manufacturer’s Serial Number
      6) Arrangement and Class
      7) Sheave Make, Size in Inches, and Bore
8) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches.

b. Motor Data: Include the following:
   1) Make and Frame Type and Size
   2) Horsepower and rpm
   3) Volts, Phase, and Hertz
   4) Full-load Amperage and Service Factor
   5) Sheave Make, Size in Inches, and Bore
   6) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches
   7) Number of Belts, Make, and Size

c. Test Data: Include design and actual values for the following:
   1) Total Airflow Rate in cfm
   2) Total System Static Pressure in Inches wg
   3) Fan rpm
   4) Discharge Static Pressure in Inches wg
   5) Suction Static Pressure in Inches wg

F. Duct Traverses:

1. Include a diagram with a grid representing the duct cross-Section and record the following:
   a. Report Data: Include the following:
      1) System and Air-handling Unit Number
      2) Location and Zone
      3) Traverse Air Temperature in Degrees F
      4) Duct Static Pressure in Inches wg
5) Duct Size in Inches
6) Duct Area in SF
7) Design Airflow Rate in cfm
8) Design Velocity in fpm
9) Actual Airflow Rate in cfm
10) Actual Average Velocity in fpm
11) Barometric Pressure in PSIG

G. Diffusers/Registers/Grilles:

1. For diffusers, registers and grilles, include the following:
   a. Unit Data: Include the following:
      1) System and Air-handling Unit Identification
      2) Location and Zone
      3) Test Apparatus Used
      4) Area Served
      5) Air-terminal-device Make
      6) Air-terminal-device Number from System Diagram
      7) Air-terminal-device Type and Model Number
      8) Air-terminal-device Size
      9) Air-terminal-device Effective Area in SF

   b. Test Data: Include design and actual values for the following:
      1) Airflow Rate in cfm
      2) Air Velocity in fpm
      3) Preliminary Airflow Rate as Needed in cfm
      4) Preliminary Velocity as Needed in fpm
5) Final Airflow Rate in cfm
6) Final Velocity in fpm
7) Space Temperature in Degrees F

H. Instrument Calibration:
   1. For instrument calibration, include the following:
      a. Report Data: Include the following:
         1) Instrument Type and Make
         2) Serial Number
         3) Application.
         4) Dates of Use
      b. Dates of Calibration.

3.7 ADDITIONAL TESTS

A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION
SECTION 23 07 00
HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   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. Glue:
   a. Armacell LLC Armaflex Low VOC Adhesive
   b. Halstead
   c. Or approved equivalent.
2. Paint:
   a. Armacell LLC Armaflex
   b. Halstead
   c. Or approved equivalent.

E. Jacketing:
   1. ITW Insulation Systems
   2. Or approved equivalent.

F. Accessories:
   1. ITW Insulation Systems
   2. Or approved equivalent.

G. Duct Insulation Accessories:
   1. Certainteed
   2. Johns Manville
   3. Owens-Corning
   4. Or approved equivalent.

H. Duct Insulation Compounds:
   1. Certainteed
   2. Johns Manville
   3. Owens-Corning
   4. 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: As indicated in the insulation tables below.

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: As indicated in the insulation tables below.

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 GENERAL INSTALLATION REQUIREMENTS

A. Verification of Conditions:

1. 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.

2. Examine areas and conditions under which duct and pipe insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Preparation:

1. Clean and dry surfaces to be insulated.

C. Installation:

1. Insulation: Continuous through walls, floors and partitions except where noted otherwise.

2. Piping and Equipment:

   a. 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.

   b. Cover insulation on pipes above ground, outside of building, with aluminum jacketing. Position seam on bottom of pipe.

D. Provide accessories as required. See Part 2 Article "Accessories" above.

E. Protection and Replacement:
1. Installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

F. Fiberglass Insulation:

1. 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.

2. 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.

G. Labeling and Marking:

1. 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.

H. 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.

I. Insulated Pipe Exposed to Weather:

1. 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.

J. Insulation Shields:

1. 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.

K. 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>
</tr>
</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>Item to be Insulated</td>
<td>System Insulation Type</td>
<td>Conductivity Range (Btu-inch per hour per SF per degrees F)</td>
<td>Pipe Size (inches)</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Heating, Steam, and Steam Condensate (above 350F)</td>
<td>1</td>
<td>0.32-0.34 at a mean rating temperature of 250 degrees F</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 to &lt; 1.5</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1.5 to &lt; 4</td>
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<tr>
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<td></td>
<td>4 to &lt; 8</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>&gt;= 8</td>
</tr>
<tr>
<td>Heating, Steam, and Steam Condensate (251F to 350F)</td>
<td>1</td>
<td>0.29-0.32 at a mean rating temperature of 200 degrees F</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 to &lt; 1.5</td>
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<td></td>
<td></td>
<td>1.5 to &lt; 4</td>
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<td>4 to &lt; 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;= 8</td>
</tr>
<tr>
<td>Heating, Steam, and Condensate (201F to 250F)</td>
<td>1</td>
<td>0.27-0.30 at a mean rating temperature of 150 degrees F</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 to &lt;1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.5 to &lt;4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 to &lt;8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;=8</td>
</tr>
</tbody>
</table>

1. Note: Insulation thickness shown is a minimum. If state codes require additional thickness, then provide insulation thickness per code requirements.

L. Piping Surfaces to be Insulated:
<table>
<thead>
<tr>
<th>Category</th>
<th>Thickness Range</th>
<th>Mean Rating Temperature</th>
<th>Flow Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating, Steam, and Steam Condensate</td>
<td>0.25-0.29</td>
<td>125 degrees F</td>
<td>1.5</td>
<td>101F to 200F</td>
</tr>
<tr>
<td></td>
<td>&lt;1, 1 to &lt;1.5, 1.5 to &lt;4, 4 to &lt;8, &gt;=8</td>
<td></td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.22-0.28</td>
<td>100 degrees F</td>
<td>1.0</td>
<td>105F to 140F</td>
</tr>
<tr>
<td></td>
<td>&lt;1, 1 to &lt;1.5, 1.5 to &lt;4, 4 to &lt;8, &gt;=8</td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Chilled Water (40F to 60F)</td>
<td>0.21-0.27</td>
<td>75 degrees F</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1, 1 to &lt;1.5, 1.5 to &lt;4, 4 to &lt;8, &gt;=8</td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Chilled Water (&lt;40F)</td>
<td>0.20-0.26</td>
<td>50 degrees F</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1, 1 to &lt;1.5, 1.5 to &lt;4, 4 to &lt;8, &gt;=8</td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Refrigerant Suction Piping (40F to 60F)</td>
<td>0.21-0.27</td>
<td>75 degrees F</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1, 1 to &lt;1.5, 1.5 to &lt;4, 4 to &lt;8, &gt;=8</td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

Contra Costa Community College District
Contra Costa College
C-633/PAC - Seismic Retrofit, Performing Arts Center
<table>
<thead>
<tr>
<th>System</th>
<th>Thickness</th>
<th>Temperature</th>
<th>Code Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerant Suction Piping (&lt;=40F)</td>
<td>2</td>
<td>0.20-0.26</td>
<td>&lt;1</td>
<td>0.5</td>
</tr>
<tr>
<td>Heating Water Storage and Air Separation Tanks</td>
<td>2</td>
<td>0.24-0.28</td>
<td>N/A</td>
<td>2.0</td>
</tr>
<tr>
<td>Chilled Water Storage and Air Separation Tanks</td>
<td>2</td>
<td>0.24-0.28</td>
<td>N/A</td>
<td>1.0</td>
</tr>
<tr>
<td>Heat Exchangers (Steam)</td>
<td>2</td>
<td>0.24-0.28</td>
<td>N/A</td>
<td>4.0</td>
</tr>
<tr>
<td>Heat Exchangers (Hydronic)</td>
<td>2</td>
<td>0.24-0.28</td>
<td>N/A</td>
<td>2.0</td>
</tr>
</tbody>
</table>

1. Note: Insulation thickness shown is a minimum. If state code requires additional thickness, then provide insulation thickness per code requirements.

3.2 **TYPE A, FLEXIBLE FIBERGLASS BLANKET**

A. Install insulation in conformance with manufacturers' recommendations and requirements.

B. 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.
3.3 TYPE B, DUCT LINER

A. Install insulation in conformance with manufacturers' recommendations and requirements.

B. 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.

3.4 TYPE 1, FIBERGLASS PIPE INSULATION

A. Install insulation in conformance with manufacturers' recommendations and requirements.

B. See General Installation Requirements above.

C. Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.

D. 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 preformed PVC molded insulation covers.

E. Insulation Shields: 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 (hot and cold piping).

3.5 TYPE 2, FLEXIBLE ELASTOMERIC INSULATION

A. Flexible Elastomeric Insulation:

1. 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 undergrade with two coats of finish as recommended by manufacturer.

B. Flexible Elastomeric Tubing:
1. 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.

C. Install insulation in conformance with manufacturers' recommendations and requirements.

D. See General Installation Requirements above.

E. 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 undergrade with two coats of finish as recommended by manufacturer.

F. Insulation Shields: 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 (hot and cold piping).

G. Install in accordance with manufacturer's instructions for below grade installation.

3.6 JACKETING

A. See General Installation Requirements above.

B. Install in accordance with manufacturers' instructions.

3.7 ACCESSORIES

A. Install insulation in conformance with manufacturers' instructions, recommendations and requirements.

B. See General Installation Requirements above.

C. Provide and install accessories for all insulation types listed in this Section.

3.8 DUCT INSULATION ACCESSORIES

A. Install insulation in conformance with manufacturers' recommendations and requirements.

3.9 DUCT INSULATION COMPOUNDS

A. Install insulation in conformance with manufacturers' recommendations and requirements.

END OF SECTION
SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   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.
   2. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

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 NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations, Ch. 3, Duct System for range hood ducts, unless otherwise indicated.
3. 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.
4. 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. 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>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.

19. Humidifier Duct:
   a. Supply duct Section 15-feet downstream from humidifier.
      1) Seams water tight.
      2) Pitch down to low point. See duct drains paragraph this Section.

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 serving Natatorium, Pool, or Spa Area</td>
<td>Single Wall, Aluminum or Type 304 Stainless Steel</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 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Sheet Metal Materials
   2. Backdraft Dampers
   3. Dampers
   4. Concealed Damper Hardware
   5. Access Doors
   6. Duct Test Holes
   7. Flexible Connectors

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. Manufacturer’s catalog data and fabrication/installation drawings for each factory fabricated duct accessory. Include leakage, pressure drop and maximum back pressure data.
   2. Shop Drawings: Indicate air duct accessories.
   3. Manufacturer’s installation instructions: Provide instructions for each factory fabricated duct accessory.
4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   a. See Division 01, General Requirements, Product Requirements for additional provisions.
   b. Extra Fusible Links: One of each type and size.

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. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section, with minimum five years of documented experience.

2. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

3. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.

4. AMCA 511 - Certified Ratings Program for Air Control Devices.

5. CSFM - California State Fire Marshal Listing for Fire Damper and Smoke Damper.


8. NFPA 92B - Smoke Control Systems in Atria, Covered Malls and Large Areas.


10. UL 555 - Standard for Safety; Fire Dampers.


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. Backdraft Dampers:
   1. Air Balance
   2. Cesco
   3. Greenheck
   4. Nailor
   5. Ruskin
   6. Or approved equivalent.

B. Dampers:
   1. Air Balance
   2. Cesco
   3. Greenheck
   4. Nailor
   5. Ruskin
   6. Or approved equivalent.

C. Concealed Damper Hardware, Cable System:
   1. Young Regulator Company
   2. Or approved equivalent.

D. Access Doors:
   1. Ductmate
   2. Cesco
   3. Ruskin
   4. Nailor
5. Outdoor Installation: Karp MX insulated exterior access door.

6. Or approved equivalent.

E. Duct Test Holes:
   1. Ventlok
   2. Or approved equivalent.

F. Flexible Connectors:
   1. Duro Dyne Corp.
   2. Ventfabrics Inc.
   3. Ward Industries
   4. Or approved equivalent.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M.
   Galvanizing: 1-1/4 ounces per square foot total both sides; ducts to have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASTM A 480/A 480M.


F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36-inches or less; 3/8-inch minimum diameter for lengths longer than 36-inches.

2.3 BACKDRAFT DAMPERS

A. Basis-of-Design: Ruskin CB D6.
B. Description: Multiple-blade gravity balanced with center pivoted blades with sealed edges, assembled in rattle free manner with 90-degree stop, adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.125-inch thick 6063-T5 extruded aluminum channel with galvanized steel braces at mitered corners. Provide mounting flange.

D. Blades: Single piece, overlap frame, parallel action, horizontal orientation, minimum 0.07-inch 6063-T5 extruded aluminum material, maximum 6-inch width.

E. Bearings: Corrosion-resistant synthetic, formed as single piece with axles.

F. Blade Seals: Extruded vinyl, mechanically attached to blade edge.

G. Blade Axles: Corrosion-resistant, synthetic formed as single piece with bearings, locked to blade.

H. Tie Bars and Brackets: Galvanized steel.

I. Return Spring: Adjustable tension.

J. Damper Capacity:
   2. Open Position: Maximum air velocity of 2,500-feet per minute.

K. Counterbalances: Adjustable zinc plated steel weights mechanically attached to blade. Must be capable of operating over wide range of pressures.

L. Finish: Mill aluminum.

M. Temperature Rating: -40 degrees F to 200 degrees F.

N. Operation of Blade:
   1. Start to Open: 0.01-inch wg
   2. Fully Open: 0.05-inch.

O. Pressure Drop: Maximum 0.15-inch wg at 1,500-feet per minute through 24-inch by 24-inch damper.

P. Factory Sleeve: Minimum 20 gauge thickness, 12-inches in length.

Q. Screen: At outdoor intake or discharge. 1/4-inch aluminum.
2.4 DAMPERS

A. Basis-of-Design: Ruskin MD 35.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg (750 Pa) or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

C. Rectangular Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design with linkage concealed in frame and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum 16 gauge thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.

a. Roll-Formed Steel Blades: 16 gauge thick, galvanized sheet steel.

b. Aluminum Frames: Hat-shaped, 10 gauge thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.

c. Roll-Formed Aluminum Blades: 10 gauge thick aluminum sheet.


e. Blade Axles: Minimum 1/2-inch diameter, plated steel, hex shaped, mechanically attached to blade.

f. Bearings: Molded synthetic sleeve, turning in extruded hole in frame.

g. Tie Bars and Brackets: Galvanized steel.

h. Mill galvanized.

i. Capacity:

1) Closed Position: Maximum pressure of 3-inches wg.

2) Open Position: Maximum air velocity of 1,500-feet per minute across 24-inch by 24-inch damper.

D. Round Volume Dampers: Single-blade suitable for horizontal or vertical applications.
1. Steel Frames: Galvanized, roll formed, minimum of 20 gauge thick with beads at each end.


9. Capacity:
   a. Closed Position: Maximum pressure of 3-inches wg
   b. Open Position: Maximum air velocity of 1,500-feet per minute.

10. Leakage: Maximum 40 cfm at 1-inch wg for 20-inches diameter damper.

11. Pressure Drop: Maximum 0.02-inch wg at 1,500-feet per minute through 20-inch diameter dampers.

   E. Jackshaft: 1-inch diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

   1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

   2. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include 2-inch elevated platform for insulated duct mounting.

2.5 CONCEALED DAMPER HARDWARE

   A. Concealed Damper Hardware: For dampers above non-removable ceilings (gyp, plaster, decorative, etc.) where access panels have not been shown on Architectural drawings or in locations where dampers are more than 2-feet above the ceiling, provide:

   1. Concealed Damper Regulator: Young Regulator Company Model 315 or approved equivalent.
2. Cable System: Young Regulator Company or approved equivalent.
3. Controller: Young Regulator Company 270-275 or approved equivalent.
4. Control wrenches, wire stops, casing nuts, and stainless steel wire.
5. Paint cover plate to match ceiling color or as directed by Architect.

2.6 ACCESS DOORS

A. Duct Pressure Class 2-inch WC and Greater: Sandwich-type design with threaded locking bolt assembly. Closed cell neoprene gasket permanently bonded to inside panel. Zinc-coated steel wing nuts or polypropylene molded knobs with threaded metal inserts - zinc coated bolts sealed to inner panel.

B. Duct Pressure Class 1-1/2-inch WC and Less: Galvanized steel assembly incorporating frame, door, hinges, and latch(es). Frame tabbed for attachment to duct panel. Double wall door panel with 1-inch insulation. Open cell neoprene gasket attached to frame. Cam latches for tight closure.

C. Plenum Doors: Extruded aluminum frames with extruded santoprene seals. Double-wall 20 gauge galvanized steel door panel with fiberglass insulation.

D. Size: Maximum size available to fit rectangular duct panel dimension or round duct diameter. Plenum doors minimum 2-feet wide by 4-feet high.

E. For outdoor installation, only provide waterproof access doors installed vertically.

2.7 DUCT TEST HOLES

A. Temporary Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.8 FLEXIBLE CONNECTORS

A. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

B. Metal-Edged Connectors: Factory fabricated with a fabric strip 4-inches wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Select metal compatible with ducts.

1. Minimum Weight: 26 ounces per square yard.
2. Tensile Strength: 480 pounds of force per in the warp and 360 pounds of force per inch in the filling.
3. Service Temperature: -40 degrees F to 200 degrees F.

   1. Minimum Weight: 24 ounces per square yard.
   2. Tensile Strength: 530 pounds of force per inch in the warp and 440 pounds of force per inch in the filling.
   3. Service Temperature: -50 degrees F to 250 degrees F.

   1. Minimum Weight: 16 ounces per square yard.
   2. Tensile Strength: 285 pounds of force per inch in the warp and 185 pounds of force per inch in the filling.
   3. Service Temperature: -67 degrees F to 500 degrees F.

   1. Minimum Weight: 14 ounces per square yard.
   2. Tensile Strength: 450 pounds of force per inch in the warp and 340 pounds of force per inch in the filling.
   3. Service Temperature: -67 degrees F to 500 degrees F.

PART 3 - EXECUTION

3.1 DUCT ACCESSORIES GENERAL INSTALLATION

A. Inspect areas to receive air duct accessories. Notify Engineer of conditions that would adversely affect the installation of the dampers. Do not proceed until conditions are corrected.

B. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" for metal ducts.
C. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

D. Do not compress or stretch damper frames into duct or opening.

E. Handle dampers using sleeve or frame. Do not lift dampers using blades, actuators, or jack shafts.

F. Adjust duct accessories for proper settings.

3.2 SHEET METAL MATERIALS INSTALLATION

A. Install bracing for multiple Sections to support assembly weights and hold against system pressure. Install bracing as needed.

3.3 BACKDRAFT DAMPERS INSTALLATION

A. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated. Provide at outside air intakes where motorized dampers are not shown on drawings.

3.4 DAMPERS INSTALLATION

A. Where installing volume dampers in ducts with liner, avoid damage to and erosion of duct liner.

B. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts for air balancing. Install at a minimum of two duct widths from each branch takeoff. Provide balancing dampers for all air inlets and outlets.

C. Install dampers square and free from racking with blade running horizontally.

3.5 CONCEALED DAMPER HARDWARE INSTALLATION

A. Coordinate location in Reflected Ceiling Plan and color of concealed damper hardware with Architect prior to installation.

3.6 ACCESS DOORS INSTALLATION

A. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sides of duct coils.

2. Downstream from volume dampers, turning vanes and equipment.
3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.

4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot (15-m) spacing.

5. Install the following sizes for duct-mounting, rectangular access doors:
   a. One-Hand or Inspection Access: 8-inches by 5-inches.

6. Install the following sizes for duct-mounting, round access doors:
   a. One-Hand or Inspection Access: 8-inches in diameter.
   c. Head and Hand Access: 12-inches in diameter.

7. Label access doors.

3.7 DUCT TEST HOLES INSTALLATION

A. Provide test holes at fan inlets and outlets where indicated and where required for air testing and balancing.

3.8 FLEXIBLE CONNECTORS INSTALLATION

A. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators. Provide sheet metal weather cover over flexible connections located outdoors. Attach sheet metal to either equipment side or ductwork side, but not both.

B. Per NFPA, do not use flexible connectors on grease exhaust fans
C. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

D. Adjust the following types in the following locations:

1. FC-1: Indoors
2. FC-O: Outdoors
3. FC-HT: High temperature exhaust systems and smoke removal systems.
4. FC-HC: High corrosive systems inclusive of all laboratory exhaust systems.

END OF SECTION
SECTION 23 34 00
HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. In-Line Centrifugal Fans

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. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound-power ratings.
   3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
   4. Material gauges and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators.

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. Sound power levels as scheduled on Drawings. If not scheduled, within 5 percent of Basis of Design at design flow.
2. Project Altitude: Base air ratings on sea-level conditions for project sites below 2,000 feet in elevation. Base air ratings on actual site elevations for project sites above 2,000 feet in elevation.

3. Operating Limits: Classify according to AMCA 99.

4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

5. AMCA Compliance: Products are to comply with performance requirements and are to be licensed to use the AMCA-Certified Ratings Seal.

6. NEMA Compliance: Motors and electrical accessories are to comply with NEMA standards.

7. UL Standard: HVAC Fans are to comply with UL 705. Fans used in grease exhaust applications are to be UL 762 listed for grease exhaust.

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 DELIVERY, STORAGE, AND HANDLING

A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.

B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

1.8 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.9 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. Belts: One set for each belt-driven unit.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In-Line Centrifugal Fans:
   1. Greenheck
   2. Cook
   3. Carnes
   4. PennBarry
   5. Twin City
   6. Or approved equivalent.

2.2 IN-LINE CENTRIFUGAL FANS

A. Description: In-line, belt-driven, centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.

B. Wheel: Cast aluminum backward inclined with inlet cone statically and dynamically balanced within its own bearings.

C. Housing:
   1. Heavy gauge steel or aluminum flat roof cap, hooded wall cap, pitched roof cap, elbow discharge with grille, and louvered wall discharge housing, factory standard finish.
   2. Removable panels for access to all interior components.
   3. Horizontal or vertical configuration, as indicated.
   4. Inlet and discharge duct collars.
   5. 1-inch thick, 1.5 pounds per cubic foot density fiberglass liner.
   6. Aluminum straightening vanes.
   7. Support bracket adaptable to floor, sidewall, or ceiling mounting.

D. Bearings and Drives:
1. **Bearings:** Heavy duty pillow block type, self greasing ball bearings with ABMA 9 life at 50,000 hours.

2. ** Shafts:** Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil.

3. **Drive:** Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 5 hp and under, selected so required rpm is obtained with sheaves set at mid-position. Fixed sheave for 7.5 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of motor. Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
   
   a. Inverter duty motor for use with variable frequency drive where indicated on Fan Schedule on Drawings.

4. **Drive:** Direct drive matched to fan loads with speed controller. Motor encased in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing.
   
   a. Electrically Commutated Motor (ECM) where indicated on Fan Schedule on Drawings.

E. **Accessories:**

1. Belt guard.

2. Motor cover for outdoor applications.

3. Inlet and outlet guard.

4. AMCA 99 Type B spark proof construction where scheduled.

5. Variable-Speed Controller: Where scheduled on Drawings, provide solid-state control to reduce speed from 100 percent to less than 50 percent.

6. Discharge Dampers: Parallel blade heavy duty steel or aluminum, where scheduled, damper assembly with blades constructed of two plates formed around and welded to shaft, channel frame, sealed ball bearings, with blades linked out of air stream to single control lever. Motorized where indicated and gravity actuated with counterweight, where motorized is not indicated.

F. **Inlet/Outlet Screens:** Galvanized steel welded grid, removable.

G. **Vibration Isolation:** Wheel and motor mounted on integral double deflection neoprene isolators.
H. Vibration isolation as scheduled and specified. Reference Section 23 05 48 Vibration and Seismic Controls for HVAC Piping and Equipment.

1. Motor: Integrally mounted, 1800 RPM maximum, with pre-lubricated sealed ball bearings. ODP for motors located indoors and TEFC for motors exposed to moisture.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install in accordance with manufacturer's instructions.

B. Install power ventilators level and plumb.

C. Fans used for exhaust of moist air are to be constructed of aluminum construction and be warranted for their application in moist conditions.

D. Fans used in welding, chemical, and/or fume exhaust applications are to be of spark-proof construction and are to be protected with coatings as required to protect parts in the airstream from the chemicals and materials the fan will be exposed to.

E. Install floor-mounting units on concrete bases.

F. Units using vibration isolation devices are scheduled on Drawings.

G. Support suspended units from structure threaded steel rods and vibration isolation device scheduled on Drawings.

H. In seismic zones, restrain support units.

I. Install units with clearances for service and maintenance.

J. Provide fixed sheaves required for final air balance.

K. Provide safety screen where inlet or outlet is exposed.

L. Pipe scroll drains to nearest floor drain.

M. Provide backdraft dampers on discharge of exhaust fans and as indicated on Drawings.

N. Duct installation and connection requirements are specified in other Division 23, HVAC Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors per Section 23 33 00, Air Duct Accessories.

O. Install ducts adjacent to power ventilators to allow service and maintenance.

P. Ground equipment.
Q. Tighten electrical connectors and terminals according to manufacturer’s published
torque-tightening values. If manufacturer’s torque values are not indicated, use those
specified in UL 486A and UL 486B.

R. Equipment Startup Checks:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to
shafts and electrical components are complete. Verify that proper thermal-overload
protection is installed in motors, starters, and disconnect switches.

3. Verify that cleaning and adjusting are complete.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan
wheel free rotation and smooth bearing operation. Reconnect fan drive system, align
and adjust belts, and install belt guards.

5. Verify lubrication from bearings and other moving parts.

6. Verify that manual and automatic volume control and fire and smoke dampers in
connected ductwork systems are in fully open position.

7. Disable automatic temperature-control operators.

S. Starting Procedures:

1. Energize motor and adjust fan to indicated rpm.

2. Measure and record voltage and amperage.

T. Operational Test: After electrical circuitry has been energized, start units to confirm proper
motor rotation and unit operation. Remove malfunctioning units, replace with new units, and
retest.

U. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and
equipment.

V. Shut unit down and reconnect automatic temperature-control operators.

W. Replace fan and motor pulleys as required to achieve design airflow.

X. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements
are made.

Y. Adjust damper linkages for proper damper operation.
Z. Adjust belt tension.

AA. Lubricate bearings.

AB. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.

AC. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

AD. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain HVAC fans. Train Owner’s maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

END OF SECTION
SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Grilles, Registers, Diffusers
   2. Louvers

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. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
   2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
   3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size and accessories furnished.

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. Air Distribution Diffuser, Register, and Grille Schedule lists Basis of Design, with any specialty accessories, construction, finish or other criteria noted on schedule. Submitted air distribution must match criteria of Basis of Design:
   a. Construction materials and appearance.
   b. Frame/installation method.
   c. Isothermal throw plus or minus 5 percent at design flows shown on drawings.
   d. Noise Criteria: NC value plus or minus 1 at design flows shown on drawings.
   e. Accessories: Equal to Basis of Design.

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. General: Manufacturer’s standard products of categories and types required for each application as referenced in other Division 23, HVAC sections, where more than a single type is specified for the application, provide single selection for each product category.

B. Grilles, Registers, Diffusers:
   1. Anemostat
   2. Carnes
   3. Environmental Air Products
   4. Kruger
   5. Metalaire
   6. Nailor
   7. Price Co.
   8. Shoemaker
   9. Titus
10. Tuttle & Bailey
11. Seiho
12. Or approved equivalent.

C. Louvers:
1. Ruskin Manufacturing
2. Pottorf
3. Carnes
4. Cesco
5. Greenheck
6. Or approved equivalent.

2.2 GRILLES, REGISTERS, DIFFUSERS

A. Diffuser, Register and Grille Schedule lists Basis of Design, with specialty accessories, construction, finish or other criteria noted on schedule. Submitted air distribution must match criteria of Basis of Design, including accessories and finish:
   2. Pressure drop equal to or less than Basis of Design at CFM on Drawings.
   3. Throw: Isothermal jet throw plus or minus 5 percent of Basis of Design at CFM listed on Drawings.
   4. Noise Criteria: Plus or minus 1 NC of Basis of Design at CFM listed on Drawings. If Basis of Design NC is below registered level, submitted must match. NC rating with 10 dB room factor or less.

B. Provide 1-, 2-, 3-, or 4-way deflection as indicated on Drawings.

C. Register Dampers: Dampers utilized with grilles. Opposed blade dampers utilizing a side operated worm drive which provides external duct operation. Slot the end of the shaft to receive a screwdriver. Factory assembled side operator. Construct of the same material as the grille. Manufacturer same as grilles/diffuser.

D. Coordinate mounting frames with ceiling construction type. Verify per reflected ceiling plans.
2.3 LOUVERS

A. General: Frame and sill styles compatible with adjacent substrate, specifically manufactured to fit into construction openings with accurate fit and adequate support for weatherproof installation. Reference Drawings and Specifications for types of substrate which will contain each type of louver. Construct of aluminum extrusions, ASTM B221, Alloy 6063-T5. Weld units or use stainless steel fasteners. On inside face of exterior louvers, provide anodized aluminum wire bird screen mounted in removable extruded aluminum frames. AMCA licensed performance ratings.

B. Blades set 3 to 5-inches on center, 37.5 degree angle with rain hook on blade, minimum blade thickness 0.080-inch, drainable blade style. Minimum 57 percent free area for 48-by 48-inch unit. Maximum water penetration 0.01 ounce water psf free area at 1000 FPM. Maximum intake pressure drop of 0.10-inch wg at 750 FPM free velocity. Provide downspouts in jambs, designed to drain water from louver for minimum water cascade from blade to blade. Provide drain gutter in head frame and each blade.

C. Reference Drawings for free area required.

D. Provide access door in duct to clean birdscreen.

E. Finish: Factory Kynar 500 fluoropolymer spray finish; color to be selected by Architect. Conform to AAMA 605.2. Apply coating following cleaning, and pretreatment. Dry louvers before final finish application. 1.2 mils total dry film thickness when baked at 450 degrees F for ten minutes.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions. Provide seismic supports, clips, and bracing per local code. Coordinate installation of framing. Provide complete coverage of rough openings by integral device flanges or auxiliary frames. Where above ceiling location is unconditioned space, caulk rough openings; repair and re-paint locations where dust entrainment streaks develop due to unsealed openings.

B. Damp locations, such as lockers, restrooms, showers, natatoriums, whirlpool/spas, to have aluminum construction even if scheduled otherwise; mounting hardware to be stainless steel.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

D. Adjust discharge direction and spread per Drawings. Adjust throws of air outlets to eliminate drafts and to distribute air during heating and cooling operation.
E. Exterior color of grilles per Architect. White finish if not otherwise scheduled or noted by Architect. Paint ductwork visible behind air outlets and inlets matte black.

F. Ceiling Membrane: Protect ceiling membrane per code. Fire caulk around openings. Provide listed radiation damper in rated roof/ceiling or floor/ceiling assemblies as required per code.

G. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

3.2 GRILLES, REGISTERS AND DIFFUSERS INSTALLATION

A. Coordinate with Architectural Reflected Ceiling Plan(s). Reflected ceiling plans determine final locations.

B. Install diffusers to ductwork with air tight connection. 18-inch straight duct Section or acoustic plenum at connection. Provide square to round adapters where required for connection to round ducts.

C. Provide integral balancing dampers for diffusers, and grilles and registers where duct manual balancing dampers are not shown or specified.

D. Linear Slot Diffusers:
   1. Coordinate connection plenum dimensions with linear slot final dimensions to conform with manufacture's recommendations, or as indicated. Total and active lengths as noted on drawings. Blank off unused Sections. Coordinate frame type with Architect.
   2. Paint surfaces visible behind air outlets and inlets, including blank-off Sections, matte black unless otherwise called for on drawings.

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. ABA Architectural Barriers Act
2. ADA Americans with Disabilities Act
3. ANSI  American National Standards Institute
4. APWA  American Public Works Association
5. ASCE  American Society of Civil Engineers
6. ASHRAE  Guideline 0, the Commissioning Process
7. ASTM  ASTM International
8. CFR  Code of Federal Regulations
9. CSA  CSA International
10. EEMAC  Electrical Equipment Manufacturers Association of Canada
11. EPA  Environmental Protection Agency
12. ETL  Electrical Testing Laboratories
13. FCC  Federal Communications Commission
14. FDA  Food & Drug Administration
15. FM  FM Global
16. IBC  International Building Code
17. IEC  International Electrotechnical Commission
18. IEEE  Institute of Electrical and Electronics Engineers
19. IES  Illuminating Engineering Society
20. ISO  International Organization for Standardization
21. MSS  Manufacturers Standardization Society
22. NEC  National Electric Code
23. NECA  National Electrical Contractors Association
24. NEMA  National Electrical Manufacturers Association
25. NETA  National Electrical Testing Association
26. NFPA  National Fire Protection Association
27. OSHA    Occupational Safety and Health Administration
28. UBC     Uniform Building Code
29. UL      Underwriters Laboratories Inc.
30. 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. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. 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. 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. 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.

7. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

8. 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, including resulting charges for work performed under other Divisions, 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.

9. 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.

10. Samples: Provide samples when requested by individual Sections.

11. 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".

12. 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.

13. 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. 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. 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/metals 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 Risk 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.

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 and DSA. 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 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, 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.

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,
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:

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.

2.2 GENERAL

A. Unless otherwise noted, 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.

B. 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.

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

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:

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. 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.

F. 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.

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.

E. **Fluorescent Luminaire Disconnect:** polycarbonate housing, tin-plated brass contacts, insulated 18 AWG, factory-installed solid copper leads, 105°C temperature rating, UL94-V2 flammability, 4A, 600V. NEC Article 410 compliant. Finger-safe line side. Push-and-click connector.

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.

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**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. Conductors 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 homeruns without approval. Homeruns for 20A branch circuits may be combined to a maximum of six current carrying conductors including neutral conductors in homeruns. 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
SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   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.
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.  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.

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.

6. **Hollow Masonry, Plaster, and Gypsum Board Partitions**: Use toggle bolts.

7. **Solid Masonry Walls**: Use expansion anchors.

8. **Sheet Metal**: Use sheet metal screws.

9. **Wood Elements**: Use wood screws.

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.

8. **Finish**: Black with safety yellow striping.

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 and DSA.

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
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. Intellicum
   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.


2. Letter Height: 1/4 inch.


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 09 23

OCCUPANCY/VACANCY SENSORS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Occupancy/Vacancy Sensors (Ceiling and Wall mounted)
   2. Combined Occupancy Sensor/Wall Switches (“Sensor/Switches”)
   3. Automatic Switches

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. Provide wiring diagrams indicating low voltage and line voltage wiring requirements.
   2. Provide, on reproducible architectural floor plan, a layout of sensors indicating their sensing distribution.

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. Use manufacturer's published testing and adjusting procedures to adjust sensors time delay, daylight sensitivity, and passive infrared sensitivity to satisfaction of the Owner, in accordance with California Title 24 requirements.
2. Prepare and complete report of test procedures and results. Submit these test procedures and results to Owner and Architect.

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. Occupancy/Vacancy Sensors (Ceiling and Wall mounted):

1. Passive Infrared Occupancy/Vacancy Sensors:
   a. Sensor Switch
   b. WattStopper
   c. Leviton
   d. Hubbell
   e. Greengate
   f. Or approved equivalent.

2. Ultrasonic Occupancy/Vacancy Sensors:
   a. WattStopper
   b. Leviton
   c. Hubbell
   d. Greengate
   e. Sensor Switch
   f. Or approved equivalent.

3. Dual Technology Occupancy/Vacancy Sensors:
   a. WattStopper
   b. Leviton
c. Hubbell  
d. Greengate  
e. Sensor Switch  
f. Or approved equivalent.

B. Combined Occupancy/Vacancy Sensor: 
   1. Sensor Switch  
   2. WattStopper  
   3. Leviton  
   4. Hubbell  
   5. Greengate  
   6. Or approved equivalent.

C. Automatic Switches: 
   1. Sensor Switch  
   2. WattStopper  
   3. Leviton  
   4. Hubbell  
   5. Greengate  
   6. Or approved equivalent.

D. Basis of Design: Occupancy/Vacancy sensor layout on Drawings are designed based on WattStopper product line. Approved manufacturers listed are allowed on condition of meeting the specified conditions including complete sensor coverage of the area controlled and switching of luminaires in the area controlled. Provide additional sensors and power switch packs as needed to provide the same level of functionality as shown on Drawings or required in Specifications. Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.
### 2.2 GENERAL

A. Occupancy sensor designation indicates sensors automatically turn lights ON when the sensor detects the presence of a person and will automatically turn lights OFF when no presence is detected for a specified amount of time (automatic-on and automatic-off).

B. Vacancy sensor designation requires someone to manually turn the lights ON. The sensor will then automatically turn the lights OFF when no presence is detected for a specified amount of time (manual-on and automatic-off). These sensors must meet California Title 24 requirements.

C. Provide occupancy sensors to sense presence of human activity within desired space and enable or disable on/off manual lighting control function provided by local switches.

D. Upon detection of human activity by detector, sensor initiates time delay to maintain lights on for present period of time. Field adjustable time delay setting from 30 seconds to 15 minutes.

E. Factory set sensors for maximum sensitivity.

F. LED lamp built into sensor indicates when occupant is detected.

G. Provide zero cross relay control with sensors and sensor/switched; relay contacts close and open with AC voltage signal is at zero.

H. Where line voltage sensors and sensor/switches are used, provide to match voltage of controlled circuit.

I. Line Voltage Sensors, Control Units, and Relays: UL listed.

### 2.3 OCCUPANCY/VACANCY SENSORS (CEILING AND WALL MOUNTED)

A. Passive Infrared Sensors:

1. **Sensor Function:** Detects human presence in floor area being controlled by detecting changes in Infrared energy. Sensor detects small movements, i.e., when people are writing while seated at a desk.

2. Provide temperature compensated dual element pyro-electric sensor and with multi element Fresnel lens.


4. Provide daylight filter to ensure that sensor is insensitive to short-wavelength infrared waves, i.e., those emitted by sun.
5. Adjustments and mounting hardware under removable cover to prevent tampering with adjustments and hardware.

6. Sensor utilizes advanced digital signal processing technology to reduce false offs without reducing sensitivity.

7. Ceiling-Mounted Sensor:
   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   b. 360 degree sensor range; coverage: 1200 SF, unless otherwise noted on drawings.
   c. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allowing coverage of large areas.
   d. Basis of Design: Wattstopper CI-300 Series.

8. Wall-Mounted Sensor:
   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   b. 90 degree sensor range with dense wide angle lens; coverage: 1000 SF for desktop motion, unless otherwise noted on Drawings.
   c. Swivel mounting bracket for corner mounting to wall or ceiling.
   d. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allowing coverage of large areas.
   e. Basis of Design: Wattstopper CX Series.

9. Building Exterior Sensor:
   a. Capable of mounting on walls, eaves or ceilings.
   b. On/off control based on daylight levels via adjustable light level setting.
   c. Line Voltage: provide sensor to match voltage of lighting controlled; capable of switching up to 1000 watts ballast and incandescent load.
   d. Adjustable time delay from 15 seconds to 15 minutes.
   e. Silicon gasketed to prevent water and dust intrusion. UL listed raintight.
f. Rated to operate in temperatures from -40 degrees F to 130 degrees F.
g. Provide isolated relay for monitoring by security system
h. Coverage:
   1) Narrow beam up to 100 foot distance.
   2) 90 degree beam up to 50 foot distance.
i. Finish: White.
k. Parking Lot Lighting Control:
   1) On/off control based on daylight levels via adjustable light level setting.
   2) Low Voltage Sensor: 24VDC power. Sensor operates luminaire high/low control.
   3) Adjustable time delay from 15 seconds to 15 minutes.
   4) Silicon gasketed to prevent water and dust intrusion. UL listed raintight.
   5) Rated to operate in temperatures from -40 degrees F to 130 degrees F.
   6) Sensor front rotates and pivots for coverage adjustment after installation.
   7) Basis of Design: Wattstopper EW Series.
   8) HID Bi-Level Controller (Outdoor Location):
      a) Purpose: Device contains dual-level capacitor and capacitor switching; replaces HID ballast capacitor to allow HID lamp to be switched instantly between high (100 percent light output) and low (25 percent light output).
      b) Compatible with CWA ballasts and pulse start, including Advance, Magnetek, and Venture ballasts. Order custom capacitor value as necessary for other manufacturers. Provide controller to match corresponding luminaire wattage and lamp type, including remote ballast application.
      c) Maintains full light level during power up for 15 minutes to prevent lamp damage.
d) Prewired with appropriate dual capacitor for lamp and ballast control.

e) Power input can be reduced to 50 percent of full power.

f) Relay Rating: 10 amps at 250VAC.

g) Zero crossing switching to protect relay and increase product life.

h) Operating Temperature Range: -10 degrees F to 104 degrees F.

i) Current Consumption: 18mA at 24VDC; maximum current output: 15mA at 24VDC.

j) Size: 3-inches by 6-inches by 4-inches. Weight: Less than 2 pounds.

k) UL listed raintight; 5-year warranty.

l) Basis of Design: Wattstopper UT-300 Series.

B. Ultrasonic Occupancy/Vacancy Sensors:

1. Sensor Function: Detects human presence in controlled floor area by detecting Doppler shifts in 40kHz ultrasound created by sensor.

2. Sensors are precision crystal controlled and do not interfere with each other when two or more are placed in same area. Sensor includes advanced digital signal processing to reduce false on signals without decreasing sensitivity, as well as immunity to RFI/EMI sources.


4. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.

5. Provide adjustments and mounting hardware under removable cover to prevent tampering.

6. Ceiling-Mounted Sensor:
   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   b. Maximum protrusion of 1.1-inches and blend in aesthetically with ceiling.
c. Coverage: 360 degree sensor range; coverage: 2,000 SF, unless otherwise noted on Drawings.


7. Ceiling Mounted Sensor - Hallway Sensor Coverage:

   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   
   b. Maximum protrusion of 1.5-inches and blend in aesthetically with ceiling.
   
   c. Coverage: 90 lineal feet.
   
   d. Basis of Design: Wattstopper UT-300-3 Series.

C. Dual Technology Sensors:

1. Sensor Function: Combined capability of passive infrared with ultrasonic or microphonic technology as described above.

2. Function: Upon a person entering a space, motion must be sensed by both technologies before lighting will be turned on. After this has occurred, detection by either technology will hold lighting on. Sensors retrigger time delay where only one motion is necessary to turn on lights within 5 seconds after turning off.

3. Wall-Mounted Sensor:

   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   
   b. 90 degree sensor range with dense wide angle lens, coverage; 1000 SF for desktop motion, unless noted on drawings.
   
   c. Swivel mounting bracket for corner mounting to wall or ceiling.
   
   d. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
   
   e. Basis of Design: Wattstopper DT Series.

4. Ceiling-Mounted Sensor:

   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
b.  360 degree sensor range; coverage: 1000 SF for half-step motion, unless otherwise noted on Drawings.

c.  Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allowing coverage of large areas.


2.4  COMBINED OCCUPANCY/VACANCY SENSOR/WALL SWITCHES ("SENSOR/SWITCHES")

A.  Completely self-contained sensor system that fits into standard single gang box. Internal transformer power supply, latching dry contact relay switching mechanism compatible with electronic ballasts, compact fluorescent, and inductive loads. Triac and other harmonic generating devices are not allowed.

B.  Passive infrared sensor technology includes advanced signal processing to reduce false triggers without increasing sensitivity. LED indicator blinks when occupant sensed.

C.  Rated to switch loads: 800 watts incandescent or 120-volt ballast; 1000 watts 277 volt ballast. Zero-crossing technology switches lighting off when AC voltage is at zero, minimizes contact wear.

D.  Provide adjustable daylight feature that holds lighting "off" when desired footcandle level is present.

E.  Provide integral off override switch with no leakage current to load or ground.

F.  Vandal-resistant lens.

G.  Includes neutral wire to meet NEC 2014 Code.

H.  Finish: White.

I.  Alerts for impending shut-off: light flash, audible, both or none.

J.  Standard Sensor/Switch:

1.  Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off). Factory set to manual on/auto off.

2.  180 degree sensor range; coverage: 150 SF for desktop activity.


K.  Dual Relay Sensor/Switch:
1. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).

2. Dual auto-off buttons on face of switch allow end-user to turn off two switch legs in room space. Built-in light adjustable level sensor only turns off second of two relays when desired footcandle level is present. Otherwise similar to specifications above for single-zone sensor/switch.

3. Defaults to Manual-ON to 50% operation for maximum energy savings.

4. 180 degree sensor range; coverage: 150 SF for desktop activity.


L. Sensor/Slide Dimmer:

1. Line voltage slider dimmer allows for manual adjustment of lighting levels from 100 percent to 10 percent; compatible with two-wire line voltage 100 percent to 10 percent electronic dimming ballasts. Separate manual button for override 'off' control.

2. 180 degree sensor range; coverage: 300 SF for desktop activity.


M. Passive Infrared Wall Switch Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

2. Adjustable sensitivity (high, low presets).


N. Dual Technology Wall Switch Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

2. Adjustable sensitivity (high, medium, low, and off presets) individually for passive infrared and ultrasonic sensing.


O. Passive Infrared Wall Dimmer Vacancy-Only Sensors:
1. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

2. If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.


P. Passive Infrared 0-10 V Wall Dimmer Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

2. If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.


2.5 AUTOMATIC SWITCHES

A. Automatic ("Sentry") Switch:

1. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).

2. Controls up to 1800 watts at 120-volt, 4100-watts at 277-volt, suitable for ballast and motor loads.

3. Compatible with Decora style faceplate.


5. Finish: Match wiring devices unless selected otherwise by Architect.

6. Capable of being connected with other sentry switches to produce 3 and 4 way switching.

7. Based on power interruptions of following durations from an upstream control panel, produces following effects:

   a. 5 Seconds: Turns lighting off with no delay.

   b. 3 Seconds: Turns lighting on with no delay.
c. 1 to 2 Seconds: Delayed off. Blinks lights and provides audible signal to room occupant. If switch push button is not pressed within 5 minutes, lights are turned off.


B. Digital Timer Switch:

1. Controls up to 1800 watts at 120 volt, 4100 watts at 277 volt, suitable for ballast and motor loads.

2. Compatible with Decora style faceplate.

3. Provide low voltage (24VAC/VDC) version where used as input to lighting relay panel; includes single-pole, double-throw isolated relay rated for 1A at 30VDC.

4. Electroluminescent LCD display shows timer countdown.

5. Time out setting range from 5 minutes to 12 hours. Lights can be turned off before time-out setting by holding down on/off button.

6. Timer countdown can be reset to beginning by holding down push button for 2 seconds.


9. Room lighting flashed and switch beeps 5 minutes and 1 minute prior to switching room lighting off. Either visible or audible features can be disabled.


PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install occupancy/vacancy sensors as directed by manufacturer's instructions. Complete connections to control circuits, occupancy sensors, power supply pack and low voltage wiring.

B. Provide power packs for sensor to control number of circuits and/or switch legs within its area of coverage.

C. Field adjust each sensor to maximize its coverage of room space.

D. Relocate sensors with ultrasonic technology to avoid being closer to HVAC diffusers and power packs than recommended by manufacturer.
E. Field set time delay for each device as noted below:

1. Classrooms and Conference Rooms: 30 minutes.

2. Restrooms: 15 minutes.

3. Storage Rooms, Janitor’s Closets, Unisex Restrooms: 5 minutes.

4. All Other Spaces: 15 minutes.

5. Time Switches: 2-hours.

F. Prior to applying dimming controls, maintain fluorescent lighting at full output for minimum of 100 hours. If this is not done, replace lamps and ballasts of affected luminaires at no cost to Owner.

G. Coordinate HVAC control requirements with controls contractor prior to installation.

H. Lighting System Testing and Commissioning:

1. Test lighting controls to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with Drawings and Specifications. Provide functional testing of sequences of operation to ensure operation in accordance with Drawings and Specifications. Provide complete report of test procedures and results to engineer and insert approved copy into project closeout documents.

2. Testing includes:
   a. Daylight Automatic Controls
   b. Occupant Sensing Automatic Controls
   c. Automatic Time and Override Controls for Interior Lighting
   d. Automatic Time and Photo Controls for Exterior Lighting

3.2 OCCUPANCY/VACANCY SENSORS (CEILING AND WALL MOUNTED)

A. See General Installation Requirements above.

B. Install per manufacturer’s written instructions and requirements.

3.3 COMBINED OCCUPANCY SENSOR/WALL SWITCHES (“SENSOR/SWITCHES”)

A. See General Installation Requirements above.
B. Install per manufacturer's written instructions and requirements.

3.4 AUTOMATIC SWITCHES

A. See General Installation Requirements above.

B. Install per manufacturer's written instructions and requirements.

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.
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 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Toggle Type Disconnect Switches
   3. Safety Switches
   4. Enclosed Circuit Breakers

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.

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. Toggle Type Disconnect Switches:
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1. Cooper
2. Hubbell
3. Leviton
4. Pass & Seymour
5. Slater
6. Or approved equivalent.

B. Manual Motor Starters:
1. Eaton Electrical
2. General Electric
3. Square D
4. Or approved equivalent.

C. Safety Switches:
1. Eaton Electrical
2. GE Industrial
3. Square D
4. Or approved equivalent.

D. Enclosed Circuit Breakers:
1. Eaton Electrical
2. GE Industrial
3. Square D
4. Or approved equivalent.

2.2 TOGGLE TYPE DISCONNECT SWITCHES

A. Rating: 120 or 277 volt, 1 or 2 pole, 20 amp, 1 hp maximum.

B. Enclosure:
1. NEMA 1: Dry locations/Indoors.

2. NEMA 3R: Damp or wet locations/Outdoors.

C. Handle lockable in 'off' position.

### 2.3 MANUAL MOTOR STARTERS

A. Quick-Make, Quick-Break. Thermal overload protection. Device labeled with maximum voltage, current, and horsepower.

B. Enclosure:
   1. NEMA 1: Dry locations/Indoors.
   2. NEMA 3R: Damp or wet locations/Outdoors.

### 2.4 SAFETY SWITCHES

A. Heavy duty fusible type and non-fusible type (as indicated on drawings), dual rated, quick-make, quick-break with fuse rejection feature for use with Class R fuses only, unless other fuse type is specifically noted.

B. Clearly marked for maximum voltage, current, and horsepower.

C. Operable handle interlocked to prevent opening front cover with switch in 'on' position.

D. Switches rated for maximum available fault current.

E. Handle lockable in 'off' position.

F. Enclosure:
   1. NEMA 1: Dry locations/Indoors.
   2. NEMA 3R: Damp or wet locations/Outdoors.

### 2.5 ENCLOSED CIRCUIT BREAKERS

A. Molded case circuit breakers:
   1. 1-, 2-, or 3-pole bolt on, single-handle common trip, 600VAC or 250VAC as indicated on drawings.

   2. Overcenter toggle-type mechanism, quick-make, quick-break action. Trip indication is by handle position.
3. Calibrate for operation in 40C ambient temperature.

4. 15 to 150 Amp Breakers: Permanent trip unit containing individual thermal and magnetic trip elements in each pole.

5. 151 to 400 Amp Breakers: Variable magnetic trip elements. Provide push-to-trip button on cover of breaker for mechanical tripping.


7. Provide handle mechanisms that are lockable in the open (off) position.

8. Circuit breakers to have minimum symmetrical interrupting capacity as indicated on Drawings.

9. Where protective devices are applied in series combination, such that the prospective available fault current exceeds the interrupting rating (AIR) of the downstream protective devices, such combinations to be UL recognized combinations. Electrical equipment using these UL recognized circuit breaker combinations to be clearly marked in accordance with NEC Section 240.86 and 110.22.

B. Enclosure:

1. NEMA 1: Dry locations/Indoors.

2. NEMA 3R: Damp or wet locations/outdoors.

C. Fusible Switch Assemblies: NEMA KS 1, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Provide fuse rejection feature for Class R or J fuses up to 600 amp. Remove if circuit breaker type is used. Provide switches of 30 to 200 amp with plug-on line side connections.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Obtain and review the submitted product data for equipment furnished by the Owner, and furnished under other Divisions of this contract, particularly under Divisions 22 and 23.

B. Confirm the equipment nameplate maximum overcurrent protection (MOCP) and make accommodations and adjustments to switches, fuses and circuit breakers as necessary to coordinate with the nameplate rating

C. Install in accordance with manufacturer's instructions.
D. Provide engraved nameplates per Section 26 05 53, Identification for Electrical Systems.

E. Apply neatly typed adhesive tag on inside door of each fusible switch indicating NEMA fuse class and size installed.

3.2 TOGGLE TYPE DISCONNECT SWITCHES

A. Install fuses in fusible disconnect switches. Coordinate fuse ampere rating with installed equipment. Do not provide fuses of lower ampere rating than motor starter thermal units.

B. Install products, systems and equipments in accordance with manufacturer's written instructions and requirements.

C. See General Installation Requirements above.

3.3 MANUAL MOTOR STARTERS

A. Provide disconnecting means within sight of each motor controller and of each motor. Motor controller disconnecting means equipped with lock-out/tag-out padlock provisions do not require a disconnect switch at the controlled motor location. Locate disconnect means in view of and not inside of equipment, such that tools are not needed to remove covers to access the disconnecting means.

B. Install products, systems and equipments in accordance with manufacturer's written instructions and requirements.

C. See General Installation Requirements above.

3.4 SAFETY SWITCHES

A. Install products, systems and equipments in accordance with manufacturer's written instructions and requirements.

B. See General Installation Requirements above.

3.5 ENCLOSED CIRCUIT BREAKERS

A. Install products, systems and equipments in accordance with manufacturer's written instructions and requirements.

B. See General Installation Requirements above.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:
   1. Luminaires
   2. Ballasts and Power Supplies
   3. Lamps
   4. Emergency Fluorescent Lamp Power Supply

B. Provide wiring for complete and operating lighting system.

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. NECA 500 - Commercial Lighting

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. Submit:
      a. Luminaires: Include electrical ratings, dimensions, mounting, material, required clearances, terminations, wiring and connection diagrams, photometric data, diffusers, and louvers.
      b. Ballasts and Power Supplies
c. Lamps

d. Emergency Lighting Equipment

2. Submittal Cutsheets: Highlight, circle or otherwise graphically indicate which option(s) are being selected for the products submitted. Cutsheets that are not edited to indicate which products and options are submitted for this project or that list only catalog numbers to identify submitted options are not acceptable.

3. Specified manufacturers are approved to submit bid. However, inclusion does not relieve manufacturer from supplying product as described.

4. Provide the following operating and maintenance instructions as required by Section 2600 00, Electrical Basic Requirements:

   a. Luminaires
   b. Ballasts and Power Supplies
   c. Lamps
   d. Emergency Lighting Equipment

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. Provide luminaires acceptable to code authority for application and location installed.
      2. Comply with applicable ANSI standards.
      3. Comply with applicable NEMA standards.
      4. Provide luminaires and lampholders that comply with UL standards and have been listed and labeled for location and use indicated by a testing agency acceptable by the AHJ (e.g. UL, ETL, and the like).
      5. Comply with CEC as applicable to installation and construction of luminaires.
      6. Comply with fallout and retention requirements of CBC for diffusers, baffles, and louvers.
7. Provide similar lamps and ballasts from common manufacturer (e.g. all fluorescent lamps from Osram/Sylvania, and all MR lamps from Ushio) unless indicated otherwise in the Luminaire Schedule.

1.6 WARRANTY

A. Warranty as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Ballast Manufacturer's Warranty: Not less than 5 years for electronic type ballasts, based on date of substantial completion. Include normal cost of labor for replacement of ballast.

2. Linear T8 and T5 Lamp and Ballast Combination Warranty: Provide ballast and lamp combinations which will result in written factory warranty covering lamps for 3 years and ballasts for 5 years, based on date of substantial completion.

3. Lamp Warranty: 30 days for incandescent, 1 year for compact fluorescent, 3 years for linear fluorescent lamps, based on date of substantial completion.

4. Warranty: LED systems and complete luminaires must have manufacturer's warranty of a minimum of 5 years from date of substantial completion, including driver.

1.7 ADDITIONAL MATERIAL

A. Furnish 2 percent extra lens or louvers for each size and type of fluorescent luminaire.

B. Furnish 10 percent extra lamps for each size and type installed.

C. Furnish 5 percent extra ballasts for each size and type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Luminaires:

1. Reference description and manufacturers in Luminaire Schedule on Drawings.

2. Or approved equivalent.

B. Ballasts and Power Supplies:

1. Linear Fluorescent Lamps Ballasts:
a. Non-Dimming Electronic for T8 Lamps:
   1) Philips Optanium Series
   2) Universal Lighting Technologies
   3) Accustart Series
   4) Osram Sylvania Quicktronic Series
   5) Or approved equivalent.

b. Non-Dimming Electronic for T5 and T5HO Lamps Ballasts:
   1) Philips Centium Series
   2) Universal Lighting Technologies Accustart Series
   3) Osram Sylvania Quicktronic Series
   4) Or approved equivalent.

c. Dimming Electronic:
   1) Lutron
   2) Philips
   3) Osram Sylvania
   4) Or approved equivalent.

2. Compact Fluorescent Ballasts:
   a. Non-Dimming Electronic Ballast:
      1) Philips Smartmate Series
      2) Osram Sylvania Quicktronic Prostart Series
      3) Or approved equivalent.

   b. Dimming Electronic Ballast:
      1) Lutron
      2) Philips
3) Osram Sylvania
4) Or approved equivalent.

c. Electronic:
   1) Osram Sylvania
   2) Robertson
   3) Philips
   4) Lightech
   5) Universal Lighting Technologies
   6) Panasonic
   7) Or approved equivalent.

d. Power Supplies for Low Voltage:
   1) W-Tran QT Series
   2) Or approved equivalent.

e. Provide special ballast types as indicated in Luminaire Schedule.

C. Lamps:

1. Linear Fluorescent Lamps:
   a. Osram Sylvania
   b. General Electric
   c. Philips
   d. Or approved equivalent.

2. Compact Fluorescent Lamps:
   a. Osram Sylvania
   b. General Electric
   c. Philips
d. Or approved equivalent.

3. Induction Lamps:
   a. Osram Sylvania
   b. Philips
   c. Or approved equivalent.

4. LED (Light Emitting Diode) Lamps:
   a. Nichia
   b. Gee
   c. Osram Sylvania
   d. GE Lumination
   e. Or approved equivalent.

5. Unless specific manufacturer not shown on this list is indicated on the Luminaire Schedule.

6. Special types as indicated on Luminaire Schedule.

7. Or approved equivalent.

D. Emergency Fluorescent Lamp Power Supply:
   1. Bodine
   2. Iota
   3. Lithonia
   4. Or approved equivalent.

2.2 LUMINAIRES

A. Luminaires: Reference description and manufacturers in Luminaire Schedule on drawings.

B. Where recessed luminaires are installed in cavities intended to be insulated, provide IC rated luminaires or other code approved installation.
C. UL label luminaires installed under canopies, roof or open porches, and similar damp or wet locations, as suitable for damp or wet location.

D. Suspended luminaires: Provide minimum 24-inch adjustability in aircraft cable length where used.

E. Recessed Luminaires: Frame compatible with ceiling material installed at particular luminaire location. Provide proper factory trim and frame for luminaire to fit location and ceiling material. Verify with Architectural Reflected Ceiling Plan prior to submittals.

F. Finishes:
   1. Manufacturer’s standard finish (unless otherwise indicated) over corrosion resistant primer.
   2. Interior Light Reflecting Finishes: White or specular finish with not less than 85 percent reflectance.
   3. Exterior Finishes: As detailed in luminaire schedule or on drawings. Refer cases of uncertain applicability to Architect for resolution prior to release for fabrication.

G. Light Transmitting Components:
   1. Plastic diffusers, molded or extruded of 100 percent virgin acrylic.
   2. Prismatic acrylic, extruded, flat diffusers, 0.125-inch overall thickness, unless otherwise noted.

H. Fluorescent Luminaires:
   1. Provide open lamp fluorescent luminaires without diffusers or guards with turret type, spring loaded sockets.
   2. To facilitate multilevel lamp switching, wire lamps within luminaire with outermost lamp at both sides of luminaire on same ballast, the next inward pair on another ballast and so on to innermost lamp (or pair of lamps).
   3. For T5HO lamps, provide twist and lock design sockets, socket body rated to 110 degrees C and socket rotor rated to 140 degrees C.
   4. Provide wire guards on exposed lamp fluorescent luminaires.

2.3 BALLASTS AND POWER SUPPLIES

A. General:
   1. Provide ballasts UL rated for specified lamps.
2. Thermal Protection: Internal UL Class 'P' with automatic reset.

3. Sound Ratings: Class 'A'. Where not available as standard product from any specified manufacturer, provide quietest rating available.

4. Total Harmonic Distortion: Not to exceed 20 percent of input current unless otherwise indicated.

5. Input Voltage: Provide universal voltage ballast matching branch circuit supply voltage.

6. Provide quantity of ballasts to provide switching as indicated on drawings.

7. Provide factory printed wiring diagram on ballast housing.

8. Type 1 construction for ballasts used in enclosed and gasketed luminaires.

9. Comply with FCC rules and regulations Part 18, Class A concerning generation of both electromagnetic interference and radio frequency interference.

B. Ballasts for Linear Fluorescent Lamps:

1. Power Factor: Minimum 97 percent.

2. Do not provide magnetic fluorescent ballasts.

3. Linear T8 ballasts: Anti-striation circuitry, and UL type CC rated for arc protection. Compliant with NEMA/CEE high performance T8 lighting system specifications and listed with NEMA Premium Electronic Ballast program.

4. Non-dimming Electronic:
   a. Tandem wiring between luminaires may be used to minimize number of ballasts while accomplishing switching requirements shown on drawings. Provide label in lamp compartment of luminaire to identify function of ballast. Label not visible from room.
   b. Provide ballasts that meet requirements of UL 935, ANSI C82.11 and bear appropriate UL label.
   c. Provide ballasts that withstand input power line transients as defined in ANSI C62.41, Category-A and IEEE 587.
   d. Provide series wired programmed start ballast unless noted on drawings.
   e. High frequency operation: Not less than 42kHz.
   f. Integral "end of lamp life" detection and shutdown circuit with automatic reset.
g. Lamp Crest Factor: Maximum 1.7 for programmed rapid start ballasts and maximum 1.85 or less for instant start ballasts.

h. Average Ballast Factor (BF): Minimum 88 percent or as indicated in luminaire schedule.

i. Provide 0 degree F minimum starting temperature ballasts for luminaires installed where exposed to anticipated ambient temperature less than 55 degrees F.

5. Dimming Electronic:
   a. Meet requirements of nondimming electronic ballasts.
   b. Do not use tandem wiring between luminaires.
   c. Ballast starts lamp at any preset light output setting and provide continuous, square law dimming from 100 percent to specified low-end output.

C. Ballasts for Compact Fluorescent Lamps:
   1. Power Factor: Minimum 97 percent.
   2. Provide ballasts which meet requirements of UL 935, ANSI C82.11 and bear appropriate UL label.
   3. Integral end of lamp life detection and shutdown circuit with automatic reset.
   4. Non-dimming Electronic:
      a. Series wired, programmed rapid start circuitry.
      b. High frequency operation: Not less than 42kHz.
      c. Lamp Crest Factor: Maximum 1.5.
      d. Average Ballast Factor (BF): Minimum 98 percent.
      e. 0 degree F minimum starting temperature.
   5. Dimming Electronic:
      a. Must meet requirements of nondimming electronic ballasts.
      b. Ballast starts lamp at any preset light output and provide continuous, square law dimming from 100 percent to specified low-end output.
c. Supply line voltage controls with air-gap disconnect.

D. Provide special ballast types as indicated in Luminaire Schedule.

2.4 LAMPS

A. Provide lamps for luminaires.

B. Provide lamp catalogued for specified luminaire type.

C. Incandescent Lamps: Not allowed unless noted in Luminaire Schedule.

D. Tungsten Halogen Incandescent:

1. Line voltage:
   a. PAR lamps: Provide HIR technology, medium screw base, size, wattage and beam spread as indicated in luminaire schedule.
   b. Tubular: Provide HIR technology, wattage and base configuration as indicated in luminaire schedule and proper type for luminaire.

2. Low Voltage: Wattage, voltage, beam spread, base style and type as indicated in luminaire schedule.

E. Fluorescent:

1. Provide 4100K fluorescent lamps unless otherwise noted in luminaire schedule.

2. Linear Fluorescent:
   a. T-8: Provide following:
      1) Bi-pin base, tri-phosphor coated.
      2) Initial 3100 lumen output.
      3) CRI equal to or exceeding 85.
      4) 36000 hours rated on 3 hour switching cycle and 42000 hours rated on 12 hour switching cycle when used with programmed start ballast.
      5) Compatible with dimming ballasts.
      6) Length and wattage as indicated in luminaire schedule.
   b. T-5: Provide following:
1) Bi-pin base, tri-phosphor coated.
2) CRI equal to or exceeding 85.
3) 20000 hours average life rated on 3 hour switching cycles.
4) Compatible with dimming ballasts.
5) Length and wattage as indicated in luminaire schedule.

c. T-5HO: Provide following:
1) Bi-pin based, tri-phosphor coated.
2) CRI equal to or exceeding 85.
3) 25000 hours average life rated on 3 hour switching cycles and 35000 hours average life rated on 12 hour switching cycles.
4) Compatible with dimming ballasts.
5) Length and wattage as indicted in Luminaire Schedule.

3. Compact Fluorescent:
   a. Single ended, four-pin plug-in base, tri-phosphor coated, CRI exceeding 82, wattage and configuration as indicated in the luminaire schedule.

F. Induction:

1. Tri-phosphor coated, CRI exceeding 80, CCT, wattage and configuration as indicated in luminaire schedule.

G. LED (Light Emitting Diode):

1. LED manufacturer will include, but not be limited to, light source, luminaire, power supply and control interface with added components as needed for complete and functioning system.
   a. Comply with ANSI chromaticity standard for classifications of color temperature. See luminaire schedule for specified LED lamp color and color temperature. UL or ETL listed and labeled.
   b. Luminaire testing per IESNA LM-79 and LM-80 procedures.
   c. Lamp life for white LEDs: 50,000 plus hours with lamp failure occurring when LED produces 70 percent of initial rated lumens.
d. Lamp life for color LEDs: 30,000 plus hours with lamp failure occurring when LED produces 50 percent of its initial rated lumens.

e. LED Drivers: reverse polarity protection, open circuit protection, require no minimum load. Minimum 80 percent efficiency. Class A noise rating.

f. Dimming: LED system capable of full and continuous dimming.

2. Special types as indicated in luminaire schedule.

2.5 EMERGENCY FLUORESCENT LAMP POWER SUPPLY

A. Description: Self-contained, nickel-cadmium based, battery-operated power supply for operating one linear or compact fluorescent lamp for minimum output of 90 minutes.

B. Minimum initial lumen output for linear fluorescent lamps: 1100 Lumens for a single T8 lamp and 1250 lumens for a single T5HO lamp.

C. Minimum initial lumen output for compact fluorescent lamps: 700.

D. Provide access hatches for emergency battery backup ballasts, adjacent to recessed downlights with 6-inch or less diameter installed in inaccessible ceilings.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install per manufacturer’s written installation instructions and requirements.

B. Install luminaires securely, in neat and workmanlike manner.

C. Install luminaires of types indicated where shown and at indicated heights in accordance with manufacturer’s written instructions and with recognized industry practices to ensure that luminaires comply with requirements and serve intended purposes.

D. Wiring:

1. Recessed luminaires to be installed using flexible metallic conduit with luminaire conductors spliced to branch circuit conductors in nearby accessible junction box over ceiling. Junction box fastened to building structural member within 6-feet of luminaire.

2. Luminaires for lift out and removal from ceiling pattern without disconnecting conductors or defacing ceiling materials.

3. Flexible connections where permitted to exposed luminaires; neat and straight, without excess slack, attached to support device.
4. Install junction box, flexible conduit and high temperature insulated conductors for through wiring of recessed luminaires.

E. Relamp luminaires which have failed lamps at substantial completion.

F. Replace ballasts deemed as excessively noisy by Architect, Engineer, or Owner.

G. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

H. Support luminaires larger than 2- by 4-foot size independent of ceiling framing.

I. Locate recessed ceiling luminaires as indicated on architectural reflected ceiling plan.

J. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

K. Exposed Grid Ceilings:
   1. Support surface mounted luminaires in grid ceiling directly from building structure.
   2. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires.
   3. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.

L. Install recessed luminaires to permit removal from below.

M. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

N. Install clips to secure recessed grid-supported luminaires in place.

O. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Architectural Drawings.

P. Install accessories furnished with each luminaire.

Q. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

R. Bond products and metal accessories to branch circuit equipment grounding conductor.

S. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.
T. Where manufactured wiring assemblies are used, insure that wiring assembly manufacturer sends components to appropriate luminaire manufacturer for respective installation of proper components.

U. Coordination:

1. Coordination of Conditions: Coordinate ceiling construction, recessing depth and other construction details prior to ordering luminaires for shipment. Refer cases of uncertain applicability to Architect for resolution prior to release of luminaires for shipment. Where luminaires supplied do not match ceiling construction, replace luminaires at no cost to Owner.

2. Electrical drawings are schematic, identifying quantity and type of luminaires used and their approximate location, but are not to be used for dimensional purposes. Reference architectural drawings for exact locations, including mounting heights.

3. Provide lighting indicated on drawings with luminaire of the type designated and appropriate for location.

4. Provide fluorescent luminaires with ballast compatible to lighting control system as shown in drawings and as specified.

5. Where remote ballasts and drivers are required, insure adequate accessibility to ballast. Upsize conductors between luminaire and ballast to accommodate voltage drop.

V. Field Quality Control:

1. Perform field inspection in accordance with Division 01, General Requirements.

2. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

W. Cleaning:

1. Clean electrical parts to remove conductive and deleterious materials.

2. Remove dirt and debris from enclosures.

3. Clean paint splatters, dirt, dust, fingerprints, and debris from luminaires.

4. Clean photometric control surfaces as recommended by manufacturer.

5. Clean finishes and touch up damaged finishes per by manufacturer's instructions.

X. Demonstrate luminaire operation for minimum of two hours.
3.2 LUMINAIRES

A. Install per manufacturer’s written installation instructions and requirements.

B. Align, mount and level luminaires uniformly. Use ball hangers for suspended stem mounted luminaires.

C. Avoid interference with and provide clearance from equipment. Where indicated locations for luminaires conflict with locations for equipment, change locations for luminaire by minimum distance necessary as directed by Architect.

D. Suspended Luminaires: Mounting heights indicate clearances between bottom of luminaire and finished floors.

E. Emergency Egress Luminaires: Provide unswitched circuit for battery charging and autotransfer circuiting for exit signs and luminaires with integral batteries. Where test switch cannot be integral to luminaire, mount remote test switch flush-to-ceiling and adjacent to egress luminaire.

F. Interior Luminaire Supports:
   1. Support Luminaires: Anchor supports to structural slab or to structural members within a partition, or above a suspended ceiling.
   2. Maintain luminaire positions after cleaning and relamping.
   3. Support luminaires without causing ceiling or partition to deflect.
   4. Provide mounting supports for recessed and pendant mounted luminaires as required by CBC.

G. Adjusting:
   1. Aim and adjust luminaires as indicated.
   2. Focus and adjust floodlights, spotlights and other adjustable luminaires, with Architect, at such time of day or night as required.
   3. Align luminaires that are not straight and parallel/perpendicular to structure.
   4. Position exit sign directional arrows as indicated.

H. Demonstrate luminaire operation for minimum of two hours.
3.3 BALLASTS AND POWER SUPPLIES

A. Install ballasts and power supplies per manufacturer's written installation instructions and requirements.

B. Reference General Installation Requirements above.

3.4 LAMPS

A. Install lamps per manufacturer's installation instructions and requirements.

B. Reference General Installation Requirements above.

3.5 EMERGENCY FLUORESCENT LAMP POWER SUPPLY

A. Install lamps per manufacturer's installation instructions and requirements.

B. Reference General Installation Requirements above.

END OF SECTION
SECTION 27 41 16

AUDIOVISUAL

PART 1 - GENERAL

1.1 GENERAL

A. Furnish and install a complete and functioning assistive listening system including cabling, receptacle plates, and electronic devices. Provide and install all components including the necessary equipment, interconnections, transducers, labor, and services required to meet specifications herein and as indicated on the drawings. Any item listed in the specification or shown on the drawings is to be included as part of this scope of work.

B. Verify site conditions including dimensions, clearances, conduit sizes, 120-volt AC power, and routing. Coordinate the exact location of the equipment with the architectural drawings.

C. Notify the Owner's Representative in writing prior to AV installation of any penetrations at walls, ceilings and floors required for the installation of audiovisual equipment and cabling.

D. Verify that the systems have been engineered prior to installation of suspended devices.

E. Conduct preliminary testing and adjustment. Submit documentation required by this specification. Participate in approval testing for acceptance. Perform final adjustments as required to meet specifications.

F. Deliver bound "as-built" system documentation and system operation training as specified in Section 3.8.

G. Provide as-built drawings of all systems, including modifications to the as-built infrastructure, if any, on 24" x 36" sheets. Provide CAD files on storage format preferred by the Owner. Store files on site in the system documentation binders in disk sleeves.

1.2 SCOPE

A. Provide all labor, materials, equipment, services and transportation required to complete all assistive listening system shown on Drawings, as specified herein, and as required by the job conditions. The assistive listening system shall connect to the existing audiovisual system and accommodate the Performing Arts Center with 350 person capacity.

1.3 QUALITY ASSURANCE

A. All materials must be newly manufactured current production models and must conform to all applicable codes and the relevant standards listed below:

   1. Infocomm International

   2. American National Standards Institute (ANSI)
3. Electronic Industries Association (EIA)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. Underwriters Laboratories (UL)

B. Coordination: The Contractor shall coordinate with all other trades in scheduling work. The Contractor is responsible for coordination of and compensation for any work or subcontractor work including but not limited to electrical, finish carpentry, metal work, and drywall.

C. Experience: The Contractor will specialize in the installation of professional audiovisual systems. Installers and engineers must individually have a minimum of five years of documented experience in the field of audiovisual system installation. At least two staff members assigned to this project must be CTS certified (or higher). The company must be an approved dealer for all major components listed in this specification.

D. Supervision: The Contractor will designate a single supervisor to oversee the installation work for the duration of the project to ensure that the system is installed in accordance with the specification and drawings. The supervisor will maintain adequate staff and be responsible for installing and testing the system on schedule. The supervisor will have at least five years of documented, recent, and similar project experience.

E. The Owner reserves the right to make use of the system prior to the completion of the punch list. Temporary use of the equipment will not constitute an acceptance of the system or any part. The Owner will not pay additional cost to the Contractor and the commencement of the warranty period will not begin for the system or any device prior to the completion of the punch list and final acceptance of the system by the Owner.

F. Codes: Contractor will comply with all applicable laws, regulations, and codes.

G. Dealership: The Contractor shall be a dealer for all major components provided and installed and shall offer full factory warranty on all products.

1.4 SUBMITTALS

A. Bid Submittals: Submit the following qualification documents:

1. Firm description.
2. Certifications: CTS
3. List of related projects. Related project list to include project name and location, description of project, contract amount, and reference name and telephone number. One of the related projects must have been completed within the last 12 months. All projects submitted shall be completed within the past five years and of similar scope as specified for this project. All related projects are subject to review and approval by the Owner's design representative.
4. Resumes of project supervisor and project engineer documenting related experience. Project supervisor and project engineer must have completed at least one installation in the past 12 months.

5. Names and scope of work for any subcontractors whose work would be part of this contract. All subcontractors are subject to review and approval by the Owner’s design representative.

6. Clearly describe any deviations from and exceptions to the specifications or drawings.

7. Along with the quoted price, provide a factor for additive changes and delete changes. The add change factor should include the product, installation, engineering, tax and shipping. Delete change factor should include listed devices, installation, tax; return shipping and verified restocking charges. No change in scope will be considered without line item documentation. This will also provide a basis for product changes necessitated by product advancement between the time of the writing of this specification and the final integration.

B. Construction Submittals: Submit complete equipment list by manufacturer, model number, and type. Include all accessories, options and functional components, and quantity to be supplied. Note that due to the project schedule, this may be submitted at the time of product ordering, and any changes required will be made knowing that restocking and expedited shipping charges will apply. Submit shop drawing to consultant for review, comment and approval. Installation is not to commence until approval has been received.

1. Submit shop drawings of any proposed design changes for approval prior to fabrication. Shop drawings are submitted to the Owner for review and approval prior to fabrication and installation. Shop drawings should include the following:

2. Point-to-point functional wiring diagrams.

3. All receptacle plates and custom fabrications.

4. Mounting and suspension systems and details for assistive listening system components requiring structural approval including.

C. Submit samples of engraved labels, cable marking system, and faceplate etching.

D. Acceptance Test Submittals: Prior to requesting the completion of the acceptance tests, submit a Preliminary Test Report including all information required in part three. Acceptance tests and final punch list will not occur until all as-built drawings and test reports have been submitted.

1.5 CLOSEOUT SUBMITTALS

A. Deliver bound “as-built” system documentation. Transfer all warranties and equipment guarantees and provide a written description of system operation to the Owner at the time of acceptance of the work by Owner. Provide system operation training as specified in Section 3.8.
B. Provide as-built drawings of all systems, including modifications to the as-built infrastructure if any, on 24-inch x 36-inch sheets. Provide CAD and/or Revit files on storage format preferred by the Owner. Store files on site in the system documentation binders in disk sleeves.

C. Operation and Maintenance Manuals: Provide three copies of system manuals per system. Manuals are in adequately sized three-ring binders, clearly labeled on spine. Manuals contain the following:

1. Equipment Manuals: Include copies of individual equipment operation manuals separated by tabbed dividers.
2. Equipment List: List all system equipment including, connectors and specialty hardware, by manufacturer and model.
3. As-built Drawings: Include folded copies of as-built drawings in clear plastic binder sleeves. Fold and insert drawings so that drawing title is clearly visible at the front of the sleeve.

1.6 PERMITS AND INSURANCE

A. Obtain any necessary permits for the execution of this work in conformance with applicable union regulations, local, State, and Federal codes and regulations.

B. Provide evidence of insurance for the full value of equipment and material located on site. Insurance will cover all losses until the work is formally accepted. Maintain additional liability insurance to protect the supplier and/or Owner against damage claims for personal injury, including death, which may arise during the performance of this work.

1.7 WARRANTY

A. Warranty Period: One year from date of Substantial Completion. Transfer all manufacturers' warranties to the Owner at the time of acceptance.

B. Guarantee the replacement of faulty materials and workmanship within 72 hours of notification at no additional cost if failure occurs during warranty period.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Basis-of-Design Product: Subject to compliance with requirements, provide products as listed or comparable product, which represent specific minimum levels of performance and function. These levels of performance and function are as published by the listed manufacturers. All material submitted is as listed, or as substitutions that meet or improve upon the performance and functional characteristics of the listed material. Such substitutions are at the sole discretion of Owner. The contractor must deliver a written request for substitution to the design consultant and written authorization must be granted by the Owner or the substitute product may not be accepted. Systems include assistive listening system for performing arts center with capacity of 350 people.
B. The stationary RF transmitter shall be capable of broadcasting on 57 channels. The transmitter shall have an SNR of 80 dB or greater. The output power shall be adjustable to quarter, half or full. Channel tuning shall be capable of being locked. The device shall have an audio frequency response of 50 Hz to 15k Hz, ±3 dB at 72 MHz. It shall have two (2) mixing audio inputs and a mixed signal output. The device shall have the following audio controls: input level, mix level and an adjustable low pass filter (contour). The device shall have an audio processor that is capable of automatic gain control and limiting.

C. The RF receiver shall be capable of receiving on 57 wide and narrow band channels. The device shall tune to a single channel and user shall not be able to change the channel. The receiver shall have an audio frequency response of 50 Hz - 15 kHz (±3 dB). The device shall have the option of worn on a lanyard or belt clip and the lanyard shall have the option of an integrated DSP driven neck loop that automatically senses and sends optimized audio signals directly to telecoils. The ALS system shall have 80dB SNR or greater, end-to-end.

D. Assistive Listening System

<table>
<thead>
<tr>
<th>Item</th>
<th>Brand</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary RF Transmitter (72 MHz) (North America)</td>
<td>Listen Technology</td>
<td>LT-800-072-01</td>
</tr>
<tr>
<td>Universal Rack Mounting Kit</td>
<td>Listen Technology</td>
<td>LA-326</td>
</tr>
<tr>
<td>Universal Antenna Kit</td>
<td>Listen Technology</td>
<td>LA-122</td>
</tr>
<tr>
<td>Intelligent DSP RF Receiver (72 MHz)</td>
<td>Listen Technology</td>
<td>LR-4200-072</td>
</tr>
<tr>
<td>Universal Ear Speaker</td>
<td>Listen Technology</td>
<td>LA-401</td>
</tr>
<tr>
<td>Intelligent Earphone/Neck Loop Lanyard</td>
<td>Listen Technology</td>
<td>LA-430</td>
</tr>
<tr>
<td>Intelligent 12-unit Charging tray</td>
<td>Listen Technology</td>
<td>LA-381-01</td>
</tr>
<tr>
<td>Assistive Listening Notification signage kit</td>
<td>Listen Technology</td>
<td>LA-304</td>
</tr>
<tr>
<td>Cabling, connectors, hardware</td>
<td>Misc.</td>
<td></td>
</tr>
</tbody>
</table>

2.2 HARDWARE AND MISCELLANEOUS

A. Connectors: Provide compatible plugs; all cable connectors have black anodized finish where available unless otherwise noted. Connector parts subject to any possible structural loading or stress are metal.

B. Rack Connections: AC power cables to the power strips shall be run in steel conduit. All in-going and out-going signal cabling shall be run in conduit independent of AC power conduit.

C. Receptacle Plates: Steel or aluminum with etched and ink filled labeling. Confirm plate color requirements prior to fabrication.

D. Antenna Cable: Conductor must be 13 AWG (RG8/U) covered by braided shield. Provide coaxial cable whose impedance matches devices requiring 50 ohm antenna connection: JSC #3040 or equal.

PART 3 - EXECUTION

3.1 GENERAL DESCRIPTION
A. The following is required for acceptance of the assistive listening system by the Owner:

1. Install complete and functioning assistive listening system as specified herein.
2. Label equipment and cables as specified.
3. Conduct adjustments and preliminary testing.
4. Report results of preliminary testing along with system documentation.
5. Participate in acceptance test and deliver final system and documentation.
6. Conduct any adjustments or re-testing required to meet the specifications.
7. Provide training to individuals designated by the Owner.

3.2 GENERAL REQUIREMENTS

A. All equipment except portable equipment is held firmly in place. Fastenings and supports are approved by a licensed structural engineer.

B. Submit shop drawings for custom fabrications including custom panels, receptacle plates, patch panel layouts, and rack elevations to the Owner for review and approval. Make submittals at least fifteen (15) days prior to scheduled fabrication. Note on the submittal the dates of scheduled fabrication.

C. Do not commence work on any portion of the project requiring Owner approval prior to obtaining such approval. Work commenced and installed prior to review and approval is accepted at the Owner’s discretion. Installation does not imply acceptance or review for acceptance.

D. Keep at the job site an up-to-date complete record set of prints and specifications. Make daily corrections and show all changes from the original contract drawings. Final As-Built drawings are required at the conclusion of the project.

E. Keep the job adequately staffed at all times. A qualified engineer approved by Owner and employed by the audiovisual contractor is to exercise engineering supervision over the entire installation and is to inspect the installation at least twice a week. Unless through illness, loss of personnel, or other circumstances beyond the control of the audiovisual contractor, keep the same individual in charge throughout the execution of the work.

F. Cooperate with Owner in order to achieve well-coordinated progress and satisfactory results. Watch for scheduling conflicts with other trades on the job. Execute, without claim for additional payment, moderate moves or changes as necessary or required by Owner prior to installation to accommodate minor design changes, rack layout changes, additional equipment, or to preserve symmetry and appearance.

3.3 EQUIPMENT CONNECTION
A. Wiring: All wiring is installed in strict accordance with broadcast standard practices. Cabling jacket color is coordinated to maintain consistent identification.

B. Cables and wiring in racks, consoles, connector boxes and on terminal strips shall be clearly marked between 2" and 4" from end of cable gasket/harness. Provide maximum label visibility. Indicate the signal type, wire number, source and destination and jack, receptacle or socket to which connector should be mated. Use appropriate diameter clear shrink tubing over surface of label for protection and permanence. Extend shrink tubing over label by approximately 1/4" at each end.

C. Cable Installation: Install vertical cable runs in conduit. All cable is to be continuous and without splices. Permanently label all cabling at all terminations. Cables is bundled and laced neatly to maintain convenient access to all equipment connections. Support cable by wireway, raceway system components, or lacing anchoring system. Except for the required service loops and cables entering into racks, no length of cable is unsupported for more than eighteen (18) inches. All AC power is run in steel conduit. Loudspeaker, microphone, and line-level signal cabling are to be separated as far as possible from all power lines.

D. Connectors:

1. Audio Connectors: All connections to screw clamp or binding post terminals require flanged or snap spade type lugs appropriately color-coded. Bare wire connected to a binding post is not acceptable. Loudspeaker connections are soldered with rosin core solder or with connectors approved by the Contract Representative.

2. Tin conductors, if necessary, with a minimum amount of 60-40 or 63-37 solder (tin/lead) with resin flux (manufactured by Kester, Ersin, or approved equal). Solder fillets are wet and flow around conductor and terminal. In no case is the general outline of the conductor to be invisible in excessive solder. The insulation is not to be charred, melted, or burned by the soldering operation. There is no evidence of either lead or terminal contamination. The final solder joint is bright and shiny and is to show no evidence of being a "cold joint."

E. Cable Labeling: Cables and wiring in racks, consoles, connector boxes and on terminal strips are clearly marked between two (2) and four (4) inches from end of cable gasket/harness. Provide maximum label visibility. Indicate the circuit type, wire number, source and destination and jack, receptacle or socket to which connector should be mated. Use appropriate diameter clear shrink tubing over surface of label for protection and permanence. Extend shrink tubing over label by approximately 1/4 inch each end.

F. Device Labeling: Label all devices logically and permanently with clarity and legibility. Submit samples for approval.

G. Power: Power conduits must be separated from other conduits containing signal lines. Provide a permanent hard-wired connection between the equipment and AC power. Connect AC power to the equipment from junction boxes designated by the Owner.
H. Grounding: Use the equipment chassis as a common point of grounding the sound system; the equipment chassis is to be grounded to earth. Cable shields are only be used for shielding (not signal) and connected to ground at the rack. All equipment is checked for ground continuity.

I. Fasteners, Hangers, Supports: Provide fasteners, supports and seismic restraints to adequately support the load as required by local building codes and Owner. Velcro and adhesive-based fasteners are not acceptable for any equipment.

J. Ventilation: Provide adequate ventilation in equipment racks to conform to the equipment manufacturer's temperature rise requirements or 20 degrees C and minimize audibility of equipment in space.

3.4 INSTALLATION

A. Provide reliable RF reception from the RF emitters to the receivers used within each audiovisual system area.

B. Connect assistive listening system to existing audio system and provide all necessary programming.

3.5 WORKMANSHIP

A. Installation of all work including cabling is neat. Velcro and adhesive-based fasteners are not acceptable for any equipment. All audiovisual devices are plumb and squarely located. Leave the job site clean and free from marks and blemishes.

3.6 INTEGRATOR’S PRELIMINARY TESTING AND ADJUSTMENTS

A. Furnish all equipment and personnel to conduct these tests in accordance with the performance specification requirements. ANSI S1.13 and EIA Standards RS-160, RS-219 and RS-189A will apply.

B. Load a "straight-wire" algorithm into DSP Audio Matrix Mixers, and outboard Dynamic Feedback Equalizers so that end-to-end system measurements can be made, as noted below. Reduce the effect of, or bypass any audio enhancement processing.

C. Initially adjust all system gain controls for optimum signal to noise ratio.

D. Report: Provide a letter/report documenting the results of these preliminary tests, including equalization curves for review by the Design Consultant.

3.7 ACCEPTANCE TESTS

A. Qualification for acceptance: Subsequent to completing preliminary testing, the contractor is to furnish Owner with a letter/report documenting the results of the preliminary tests and two copies of "as-built" wiring diagrams of the entire system including the connection numbers, their locations, and cable color coding. The receipt of this documentation does constitute the audiovisual contractor's acknowledgment that the installation is complete and conforms to this
specification, and is ready to be reviewed and tested by the Owner and delegated representatives.

B. Acceptance Test: Owner’s representatives are present during the acceptance testing and require the assistance and cooperation of the audiovisual contractor.

C. Each major component is demonstrated to function, as specified.

D. If any test shows the equipment or system is defective or does not comply with the specifications, the AV contractor is to perform all required repair or replacement and provide for follow-up acceptance tests.

E. Delays: If the acceptance of the system is delayed because it does not meet the specification requirements, the Audiovisual Contractor shall reimburse Owner for all expenses of consultants retained to represent the Owner during the final acceptance testing. This includes costs associated with travel to the site, and reimbursable business travel expenses.

3.8 SYSTEM DOCUMENTATION, TRAINING AND FIELD SUPPORT

A. Operation and Maintenance Manuals: For each system, provide three "hard" copy of system manuals per system. Manuals are in adequately sized three-ring binders, clearly labeled on spine. Manuals contain the following:

1. Service Reference Cover Sheet: Provide a cover sheet with audiovisual contractor name, address, and telephone numbers.

2. Equipment Manuals: Include copies of individual equipment operation manuals separated by tabbed dividers. Order manuals in nominal signal path order (i.e. sources first, amplifiers and loudspeakers last.

3. Equipment List: List all system equipment, including connectors and specialty hardware, by manufacturer and model.

4. As-built Drawings: Include folded copies of as-built drawings in clear plastic binder sleeves. Fold and insert drawings so that drawing title is clearly visible at the front of the sleeve. Post 24"x36" laminated as-buils on control room wall.

B. Training: Provide up to 2 hours of system training to operator(s) designated by the Owner. Some training time may be used as live "first event" assistance. Assist and oversee operator(s) during these events.

END OF SECTION